COMMERCIAL FISHERIES Review

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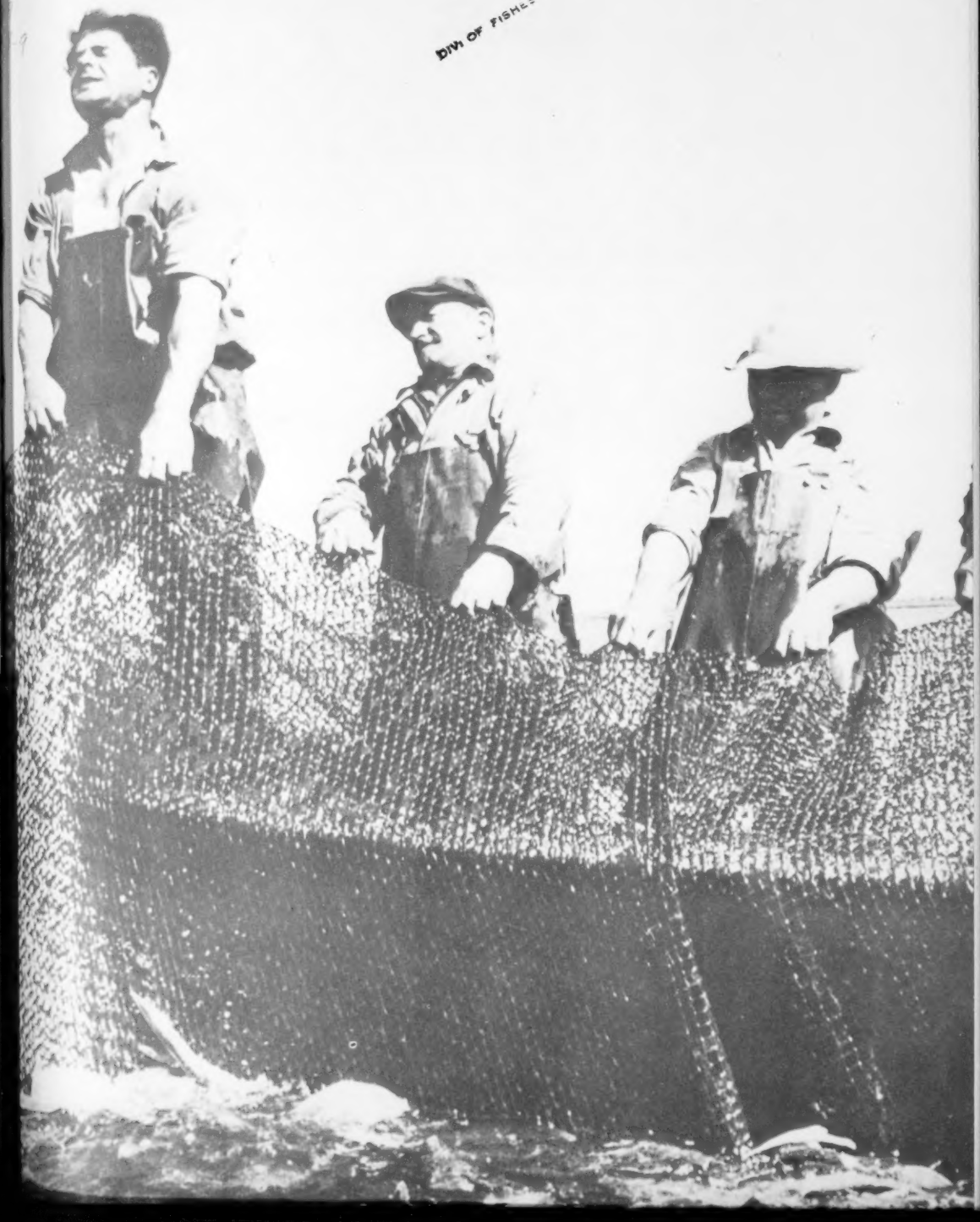
DIV. OF FISHES



COVER: Pulling net to surface. (Acme)

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

Fishermen's Memorial
Gloucester, Mass.

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

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PRESIDENTIAL PANEL URGES ACTION ON WORLD HUNGER

"The scale, severity, and duration of the world food problem are so great that a massive, long-range, innovative effort unprecedented in human history will be required to master it." So states the President's Science Advisory Committee (PSAC) after a year-long, 3-volume study released in June: "The World Food Problem."

The PSAC report emphasizes the "reality of the food shortage that will occur during the next 20 years" unless agricultural production in the developing countries can be increased through the use of fertilizers, new plant varieties, pesticides, farm machinery, and new systems of planting crops adapted to each country's climate and soil.

It recommends that "subsistence farming" be transformed into "commercial agriculture." To do this, improved transportation, marketing, farm credit, storage, and distribution systems will be needed on a huge scale. The problem of increasing food production is the overall problem of economic development. It cannot be isolated from the problems of the world's developing nations.

And the committee urges the United States "to take the lead in mounting a global effort in concert with other developed nations and with international organizations that will bring to bear the technical skills and capital resources needed to reverse the downward trend of the developing countries and to restore the chance of their people for a better life.

"We are unanimous in the belief that the United States must assume leadership of the free world and all its international institutions in a coordinated, long-range development strategy for raising the economic level of the poor nations, thereby meeting the threat of hunger, increasing the volume of world trade and economic activity and contributing to the achievement of the goal of ultimate importance, a lasting peace."

The study was carried out by PSAC's World Food Panel--divided into subpanels totaling 110 persons from Government, universities, foundations, and private industry. Thirty of the 110 were employes of the U. S. Department of Agriculture.

PSAC and UN Reports

The PSAC report came at about the same time as a United Nations report on the world food problem. (See "Commercial Fisheries Review," July 1967, p. 2.) Both are comprehensive studies that reflect the scope and depth and urgency of the problem. Both warn against the frightful cost of failure. Both blueprint plans of action.

The UN report places greater stock in the value of nonconventional food sources in supplementing conventional agriculture: oil-seed meal, fish protein concentrate (FPC), single-cell products, and the effective use of synthetic essential amino acids and nonspecific nitrogen sources. It urges the UN's Economic and Social Council and the General Assembly to "strongly recommend" these as objectives to the UN family, private foundations, and private industry.

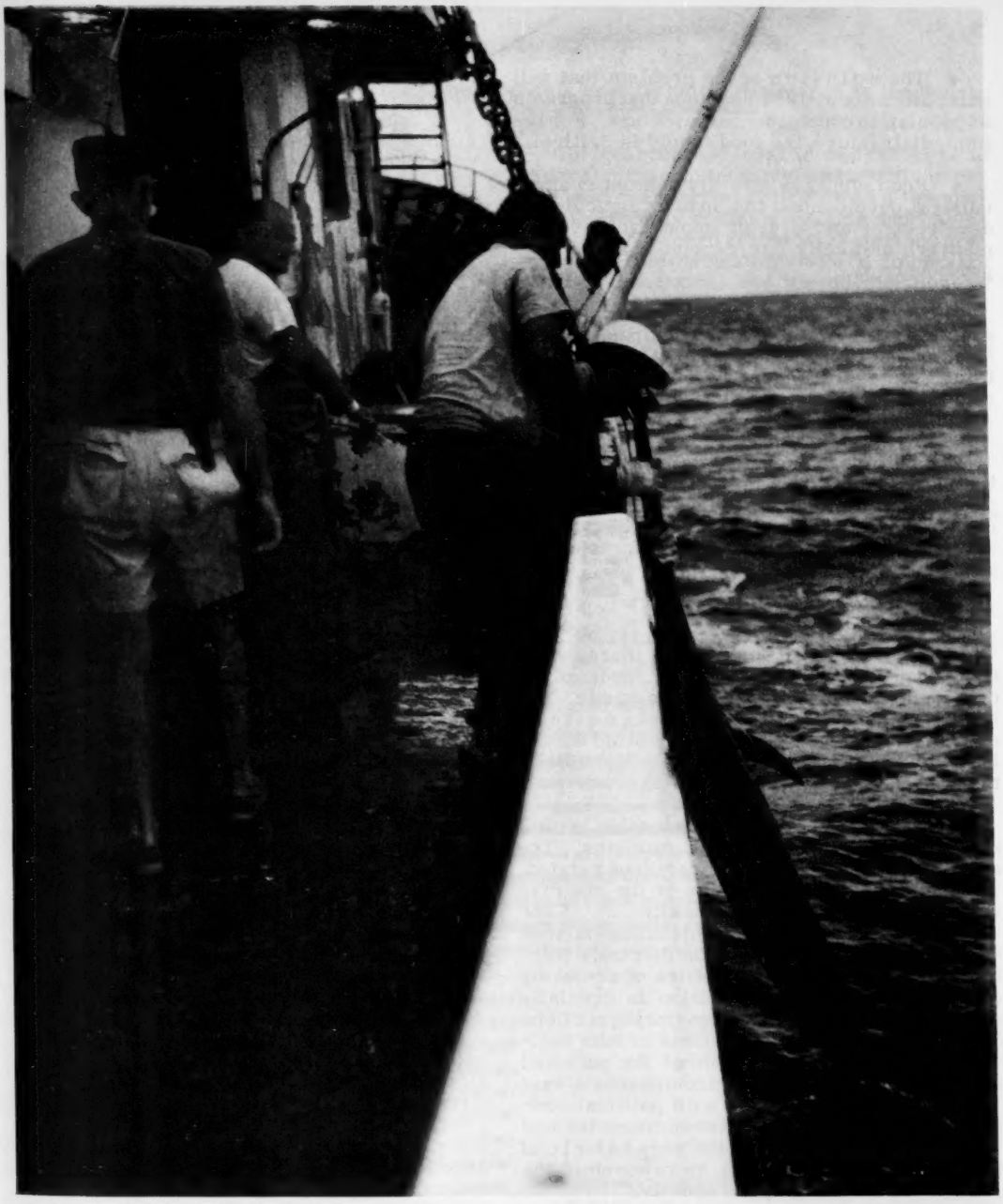
The UN report also places the tag of "high priority" on the fishery resources of the seas and inland waters--conventional sources of protein.

"If the world is to have a realistic chance of meeting its future food needs, the conventional sources of protein and other essential nutrients must be supplemented by new and unconventional ones," states the UN report. "Some of these unconventional sources are not dependent on the availability of agricultural land. It is in the development of such sources that the application of modern science and technology can make the greatest additional contribution towards closing the protein gap."

The reader of the PSAC and UN reports is likely to be overwhelmed by the wealth of information and to be convinced that the experts have gone over every inch of the ground. For him, two questions remain unanswered: "How much of these blueprints will be put into the soils of the poor nations?" And: "In time?"

PSAC REPORT: A Summary

In addition to the basic scope of the problem and the great effort needed to master it, the PSAC report sets forth 3 other basic conclusions:



Bringing a broadbill swordfish aboard BCF research vessel "Oregon" during exploratory longline set off Florida coast.
(Photo: F. Nudi)

• "The solution of the problem that will exist after about 1985 demands that programs of population control be initiated now. For the immediate future, the food supply is critical."

• "Food supply is directly related to agricultural development and, in turn, agricultural development and overall economic development are critically interdependent in the hungry countries."

• "A strategy for attacking the world food problem will, of necessity, encompass the entire foreign economic assistance effort of the United States in concert with other developed countries, voluntary institutions, and international organizations."

The report concludes that the solution to the World Food Problem during the next 20 years is "biologically, technologically, and economically possible." But it will require major programs and maximum efforts by all nations.

Food and Population

World food requirements will increase by about 50 percent by 1985--but the needs of the developing nations are expected to double. The report recommends that developing nations support and expand voluntary programs of family planning to assure a long-range adjustment of food needs with population control.

"Food shortage and rapid population growth are separate, but interrelated problems. The solutions, likewise, are separate, but related. The choice is not to solve one or the other; to solve both is a absolute necessity . . . . The twin problems of food and population balance have one feature in common that adds immeasurably to the difficulties of achieving control. Their eventual solution is crucially dependent upon success in convincing millions of citizens in developing nations to take individual action. The provision of the personal incentives is a task that encompasses a vast array of social, economic, and political considerations which differ between countries and within countries. Indeed, the very fabric of traditional societies must be rewoven if the situation is to change permanently."

Agricultural Development

The PSAC report warns against a "panacea" approach. It stresses agriculture as the main source of food during the next 20 years within needy nations.

Capital Investment and Economic Health

If "subsistence" farming is to be transformed into modern commercial farming, huge investments of capital will be needed (the report details them): for irrigation, fertilizer, new seed varieties, pesticides, and agricultural machinery. The report emphasizes needs for improved farm credit, marketing, storage and distribution systems, and improved transportation. Commercial food production for the market depends on total economic development. There must be a balance between modernization of the farm sector and the industrial sector "if either is to flourish and to achieve sustained growth."

Economic Assistance

The report underscores the need for long-term support of economic assistance to hungry nations:

"The eventual alleviation of world hunger will require many years. It is dependent on far-reaching social reforms and long-range programs of hard work which offer no promises of quick and dramatic results . . . . Long-term commitment of substantial resources is an absolute necessity. The fallacious notion that foreign aid's main business is to put itself out of business should be dropped for the remainder of this century. All programs based upon this thesis have succeeded only in proving otherwise. When one program of assistance has terminated, others have had to take over . . ."

Research and Development

The report avers that agricultural technologies are not directly transferable to different soils and climates. Research is necessary to adapt agricultural systems for each region.

"A blueprint for a bicycle or a steel mill can be shipped overseas and utilized without alteration but the blueprints and architecture for a food crop must be developed overseas. There, as in the United States, new plant varieties, each better than the last, must be produced frequently to increase plant resistance to insects and disease. There is an urgent need to carry out the self-sustaining, continuing programs of research and development that are essential to modern food production."

Economic Demand for Food Needed

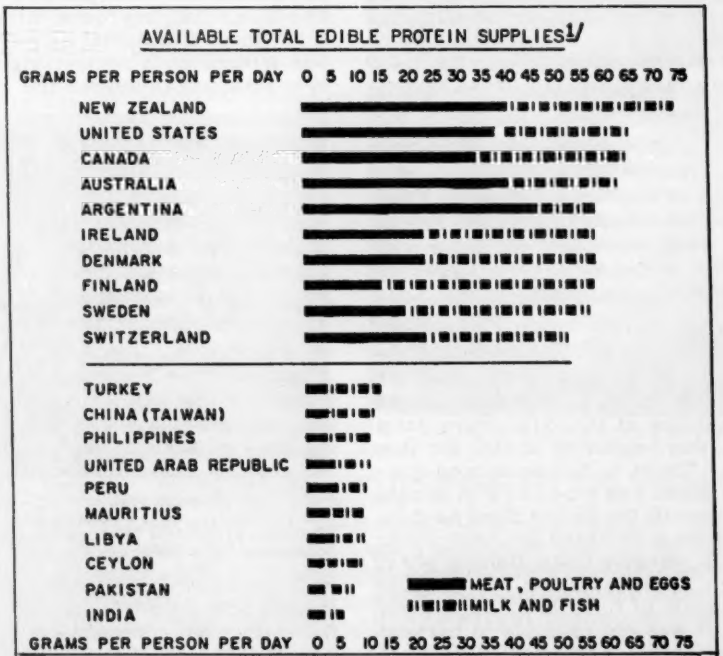
It is effective economic demand--not nutritional need alone--that stimulates increased

food production, the PSAC report states. The annual capital investment required to increase food demand to the levels required to meet needs is about 4 percent of the Gross National Product (GNP) of the developing countries; the 4 percent amounts to about $12 billion in the 1965-66 GNP.

Manpower

Despite these enormous requirements for capital investment, the report warns that the greatest problem to be faced is the shortage of trained manpower. It urges renewed emphasis upon technical assistance to the developing countries:

"The scarcest and most needed resource in the developing countries is the scientific, technical, and managerial skill needed for systematic, orderly decision-making and implementation. Through technical assistance programs, the United States should emphasize guidance, education, and the development of indigenous capabilities--for the long-term--because the task in the developing nations has only just begun and will continue for many decades to come."



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WORLD FISHING IS INTERDEPENDENT, COMPLEX AND CHANGING, BCF DIRECTOR SAYS

The action of one fishing nation may set off a series of counteractions by other nations--changing the status of a fishery and creating new problems. Problems and continuing change "have become a way of life in the fisheries and we must learn to live with them," H. E. Crowther, BCF Director, told the Southeastern Fisheries Association in Jacksonville, Fla., on July 1.

Crowther was discussing some international and national developments in fisheries that are affecting or will affect the U. S. Not many years ago, he said, the U. S. fishing industry was "fairly well isolated," but the situation changed completely. Imports increased and foreign vessels began to fish off U. S. coasts.

In 1966, an estimated 1,100 Soviet fishing and support vessels caught and processed over 2.2 billion pounds of fish from waters adjacent to the U. S. The Soviets are not alone, he said, "but perhaps they represent the most dramatic change in fishing operations in areas and on resources we once considered our own."

BCF's Director said that foreign fishing off U. S. coasts has affected both fishery resources and the attitudes of the public, industry, Congress, and Government. Its first effect was to make the U. S. look more closely at its own fishing operations and at the resources it once considered its own.

SOVIET FLEETS ARRIVE

In 1966, a large Soviet fleet appeared off the coast of Washington and Oregon and harvested substantial quantities of Pacific hake--at a time the U. S. was beginning to fish for this unused species. The U. S. had developed special gear and a plant was erected to handle hake. But the size of the Soviet fleet and its operating methods preempted the area--preventing the U. S. vessels from fishing where the hake were concentrated and tending to break up the schools of fish. Even away from the Soviet fleet, it was not possible to harvest the fish economically. The small U. S. fleet took 1,700 metric tons; the Soviets 128,000 metric tons.

Soviet fishing on U. S. Pacific ocean perch grounds decreased drastically the landings of U. S. vessels.

On the east coast, the Soviets located concentrations of red hake offshore before the fish moved inshore within reach of U. S. vessels. The Soviets fished hake to such an extent that there were few left for inshore vessels. The Soviets also fish many other species.

CONGRESS REACTS: 12-MILE ZONE

The activities of Soviet and other foreign vessels prompted Congress to extend U. S. fishery jurisdiction to 12 miles. This resulted in some benefits to U. S. fisheries. But the 12-mile zone itself initiated a series of developments that included negotiations with the countries it affected.

The law recognizes traditional fisheries, Crowther noted, so it was necessary for the U. S. to entertain claims by other governments to such fisheries. Japan and the USSR notified the U. S. that they were interested in talking about these traditional fisheries--and the U. S. was interested in restricting their operations in certain areas beyond the 12-mile limit.

Fig. 1 - The refrigerated fish carrier "Gutsul" (3,600 gross tons) was providing support to 6 Soviet medium trawlers fishing off California's Half Moon Bay in early April 1967. The vessel was constructed in the Soviet Union in 1966.

Negotiations with the USSR resulted in limited U. S. concessions for Soviet vessels to fish within the contiguous fishery zone off the Alaskan coast. Also, the Soviets were permitted to transfer cargo and conduct other loading operations in 8 small areas within the 3- to 12-mile zone; 5 are off Washington and Oregon, and 3 off Alaska. In exchange, the Soviets agreed not to fish, or to decrease their

fishing effort, in some areas beyond the 12-mile limit that the U. S. west coast industry considers critical to its operations.

One such area is between Grays Harbor, Washington, and the mouth of the Columbia River, where Pacific hake concentrate. The area extends about 30 miles from shore. As a result of Soviet agreement, the developing U.S. hake industry has benefited. Catches by the small U. S. fleet since May have shown promise.

Similar agreements have been made with the Japanese for the west coast fisheries. The agreements with both nations are for one year and negotiations will be continuing.

Negotiations with the USSR concerning east coast fisheries have not been as rewarding, but they will continue.

The U. S. has held preliminary talks with Canada, Mexico, and Honduras on their declarations of exclusive fishing.

Crowther summed up these negotiations and predicted a problem: "It is entirely possible that bilateral agreements between the U. S. and the USSR, Japan, Canada, and Mexico will allow each nation to continue fishing in a more or less satisfactory manner for a period of years. But the overall problem is much larger. As many nations enlarge their fleets and seek more fish, the time will come when some resources will be overfished."

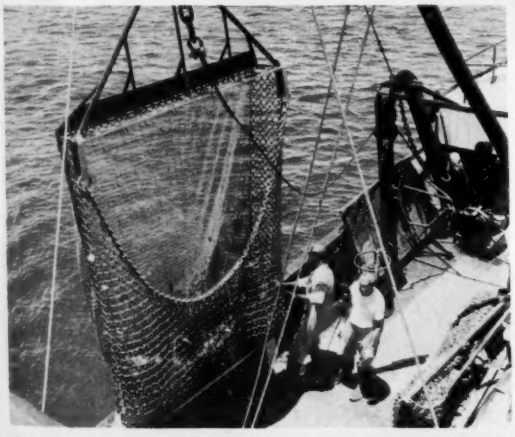


Fig. 2 - A 10' Georges Bank style scallop dredge with a catch of calico scallops swings over the railing of the BCF's research vessel "Silver Bay". (Photos 2-5: J. B. Rivers)

Fig. 3 - The "eye" of a calico scallop.

Fig. 4 - A handful of calico scallop meats.

CONSERVATION AND RESEARCH

BCF's Director asked: "Do we fish until the resource is gone, or do the nations agree on means to conserve the resources? All will agree that conservation is necessary, but how do we arrive at meaningful conservation measures? . . . . Who gets what share of fish?" He said a formula is needed--either global quotas, country quotas, assignment of specific areas to each country involved, or some other means. The U. S. is working to solve these tough prob-

lems in a way that "will be practicable, equitable, and in the interest of our fishing industry."

He pointed to other difficult problems that touch the fishing industry but relate more broadly to ocean research. They arise because many nations and international agencies are conducting research "either in the sea, on the sea, or under the sea." They produce the danger of duplicating effort and national resources and creating gaps in programs because coordination is lacking.

The U. S. recently introduced a resolution in the United Nations recommending a UN study of marine resource problems. The resolution passed and Dr. John Lyman was selected to direct the study. The UN study will seek to define clearly the relationships of various international groups conducting marine investigations. It may end duplicating research programs and point the way to more orderly research.

THE U. S. SCENE

Crowther reported to the Southeastern Fisheries Association: "In the past 2 years there has been more interest in food from the sea, and especially fisheries, by more organizations than I have ever seen before." This interest is partly a reaction to foreign fishing off U. S. coasts. Another reason is the publicity on fish protein concentrate (FPC)--and the world food shortage.

At its last session, Congress set up a Marine Resources and Engineering Development Council, composed mainly of Cabinet members, to help coordinate the oceanographic work of many U. S. agencies. Vice President Humphrey is chairman. The Council has selected 9 items on which to concentrate attention: food from the sea heads the list; special reference was made to the role FPC can play. On FPC, Crowther said: "We are particularly pleased with the tremendous interest shown by industry."

Some Industry Problems

Discussing the current situation, Crowther said sales slowdown in some fishery products was having a "rather serious effect" in segments of the industry. Shrimp and lobster seem unaffected, but groundfish fillets and other lower-priced products are having some trouble. He noted that many persons blame this difficulty on "Black Friday" (the Roman Catholic Church change on meatless Friday) "but a more thorough consideration of the problem would indicate that is only one of the reasons."

Said Crowther: "We have found it very difficult to measure the effects of the Bishops' decree on the consumption of fisheries products. In some areas, it definitely appears to have had an adverse effect, while in other areas there has been little or no effect on sales." He said industry is attempting to finance a major effort in market promotion.

He mentioned other problems of national importance: pollution, loss of estuarine areas, resource problems (e.g., menhaden), and increasing imports.

Bright Future for Gulf and South Atlantic Fisheries

BCF scientists are convinced that the Gulf and South Atlantic area is one of the most productive available to the U. S. While fishery production in some areas has remained relatively static or declined, production here has increased dramatically.

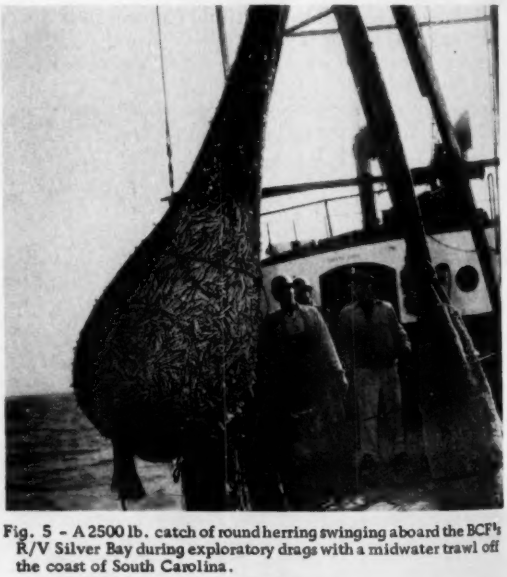


Fig. 5 - A 2500 lb. catch of round herring swinging aboard the BCF's R/V Silver Bay during exploratory drags with a midwater trawl off the coast of South Carolina.

In 1940, Gulf fishermen produced only 250 million pounds of fish. By 1950, they had more than doubled it--to 571 million pounds. And by

Boatload of herring will be sold as bait. (Photo: USIA/National Archives)

1960 had doubled it again--to 1.3 billion pounds. In 1965, production reached 1.5 billion. During this 26-year period, production rose from 6 to 31 percent of total U. S. catch. It is still growing.

From 1940-1966, the catch value to fishermen in the South Atlantic and Gulf increased from under $15 million to nearly $150 million. In 1966, the catch in these waters accounted for 33 percent of the total U. S. value.

These waters can yield even greater quantities of mullet and Spanish and king mackerel. The calico scallop fishery could become one of the most valuable commercial fisheries in this region.

Also, there are enormous stocks of herring and herringlike fish. BCF estimates thread herring stocks off Florida's west coast alone can yield many thousands of tons without harming existing stocks. Crowther predicted that the development of this fishery could have a profound impact on the fishing industry and the general economy of Florida. As for BCF's role, he said, "we intend to put as much as possible into this area."

UNITED STATES

Marketing of Edible Fishery Products, First Half 1967

Total U. S. supplies of edible fishery products likely will reach 2.7 billion pounds edible weight in 1967, virtually the same as in 1966. Stocks at the beginning of 1967 were a record high, but a reduction in output of the domestic fisheries seems probable. Also, imports and inshipments are expected to decline. Total fishery product use by the civilian population is expected to exceed 1966 slightly, but per-capita use is expected to hold near 1966's 10.6 pounds.

There have been smaller runs of both pink and red salmon. The pack of canned salmon probably will be lower than 1966. Haddock on traditional fishing grounds is less abundant this year and no sharp upturn in fishing effort is likely.

The abundance of flounder is unchanged or lower than 1966; New England landings were off about 17 percent through May. Landings of cod, ocean perch, and whiting are not likely to be any heavier than last year's, and could be lower.

Among shellfish, a good crop of Gulf brown shrimp is being taken. Conditions are generally favorable to develop white shrimp. But scallop landings will be down from 1966 due to reduced abundance. There are indications of fewer Maine lobsters this year: the catch for the first 4 months marks it the poorest since 1944.

Frozen Inventories Up

At the end of June, frozen inventories of fishery products totaled nearly 6 percent above 1966, but most of the increase was registered by a comparatively few items. Stocks of shrimp rose along with flounder and ocean perch fillets and whiting. Holdings of cod fillets, crabs, spiny lobster tails, and scallops were all sharply below this time last year. Also, holdings of fillet blocks were down sharply, possibly indicating some tightening in supplies of the popular fish sticks and portions for which they are used.

Retail prices for fishery products are expected to be steady to somewhat more favorable for consumers during late summer and fall. The prospective reduction in domestic landings, and some decline for imports, will about offset effect of heavier inventories at the beginning of 1967.

Among major products, shrimp prices likely will soften during the third and fourth quarters in view of expected large landings. Canned salmon prices likely will strengthen, however, due to the rapid reduction of stocks of 1966-caught salmon and the small packs this year. (BCF Branch of Current Economic Analysis.)

Interior Allocates $4.1 Million to States for Commercial Fisheries Study

The Department of the Interior announced in July the apportionment of $4,100,000 in grants in aid for commercial fisheries research and development to the states and to Puerto Rico, American Samoa, Guam, and the Virgin Islands. The money was appropriated by Congress under a 1964 act to improve U. S. commercial fisheries resources. Similar apportionments were made in July 1965 and 1966.

Each state or other unit is allocated money based on the value of its commercial fishing industry. The maximum allocation is 6 percent of the total fund, and the minimum .05 percent.

Maximum permissible grants of $246,000 each were allocated to Alaska, California, Florida, Louisiana, Massachusetts, Texas, and Puerto Rico.

Under the fisheries research and development program, the states are reimbursed up to 75 percent of the costs of approved projects. BCF administers the research and development programs.

Allocations
Commercial Fisheries Research and Development Fund
Fiscal Year 1968

Alabama	$ 44,400	Nevada	$ 20,500
Alaska	246,000	New Hampshire	20,500
Arizona	20,500	New Jersey	150,000
Arkansas	20,500	New Mexico	20,500
California	246,000	New York	177,600
Colorado	20,500	North Carolina	58,700
Connecticut	20,500	North Dakota	20,500
Delaware	21,700	Ohio	54,800
Florida	246,000	Oklahoma	20,500
Georgia	92,600	Oregon	127,500
Hawaii	33,500	Pennsylvania	46,000
Idaho	20,500	Rhode Island	25,700
Illinois	22,800	South Carolina	22,100
Indiana	20,500	South Dakota	20,500
Iowa	20,500	Tennessee	20,500
Kansas	20,500	Texas	246,000
Kentucky	20,500	Utah	20,500
Louisiana	246,000	Vermont	20,500
Maine	192,600	Virginia	181,600
Maryland	171,600	Washington	204,700
Massachusetts	246,000	West Virginia	20,500
Michigan	20,500	Wisconsin	20,500
Minnesota	20,500	Wyoming	20,500
Mississippi	117,100	American Samoa	59,000
Missouri	20,500	Guam	20,500
Montana	20,500	Puerto Rico	246,000
Nebraska	20,500	Virgin Islands	20,500

The tabulation lists the apportionment of funds to the states and other entities for the 1968 fiscal year which began July 1, 1967.

Shrimp Inventories Are Heavy

Production of canned shrimp from January 1 to July 1, 1967, was 1,266,000 cases, compared with 632,000 cases for the 1966 period. This year's pack rates among the highest on record.

As a result, various segments of the shrimp canning industry and the American Shrimp Canners Association have indicated plans to actively promote this product during September. They have requested BCF's assistance, particularly at retail level. BCF has recommended that canned shrimp be placed on the U. S. Department of Agriculture "List of Foods in Plentiful Supply" for September.

Fish Meal Supply Rose, Solubles Fell in First 5 Months

Based on domestic production and imports, the available supply of fish meal in the U. S. for the first 5 months of 1967 was 288,342 short tons--96,812 tons (or 50.5 percent) more than during 1966 period.

Domestic production was 38,894 tons (6.6 percent) lower, but imports were 249,448 tons (67.8 percent) higher than in January-May 1966. Peru continued to lead with shipments of 173,361 tons.

The U. S. supply of fish solubles amounted to 18,122 tons--down 16.5 percent from the 1966 period. Domestic production decreased 17.5 percent and imports fell 10 percent.

Japanese Group Reports on U. S. Market for Canned Tuna

The Japan External Trade Promotion Organization (JETRO), at its June 6 meeting with tuna packers in Shimizu, Japan, reported the results of its recent marketing survey of U. S. consumption of institutional-size (4-lb. 6's) tuna packs. In the past, JETRO had made several marketing surveys of small, family-size canned tuna consumed in the U. S.

The survey was conducted at the 3 major market centers of Boston, New York, and Chicago. Factors investigated were: (1) quantity used by volume purchasers, country of product's origin, type of pack, and pattern of use by can size; (2) kind of suppliers, method of payment, motive for buying, purchasing pattern based on price; (3) comparison of use between U. S. and Japanese packs; (4) principal canned tuna recipes; and (5) consumer attitude toward quality, color, and style of pack.

Survey's Scope

The survey covered 422 establishments in the 3 cities, including restaurants, schools, hospitals, hotels, clubs, cafeterias, and food caterers. A further in-depth study was made at 102 places.

The JETRO findings:

• Of the 6,728,000 cases (converted to 7-oz. 48's) of canned tuna packed in Japan in 1966, 5,280,000 cases were exported to foreign countries. Exports to the U. S. totaled 2,476,000 cases of tuna packed in brine, of which 1 million cases were institutional-size packs. The U. S. canned tuna production in 1966 totaled nearly 20 million (standard) cases, of which 2.2 million cases were institutional packs. Of Japanese canned tuna

exports to the U. S., 40.4 percent were institutional packs; this size pack accounted for only 11 percent of the total U. S. canned tuna production.

• The leading volume consumers of institutional packs are restaurants, cafeterias, and luncheonettes, which consume 40-50 percent of the total supply. These are followed by educational institutions with 30-40 percent, hospitals, sanitariums, and prisons with 4-8 percent; the rest are hotels, motels, mass feeding facilities, clubs, caterers, and military establishments.

• Of the 102 leading volume purchasers, 58 used one brand only, 28 used 2 brands, 12 used 3 brands, and 4 used 4 brands. Grouped by country of origin, 48 used only Japanese products, 29 used only U. S. products, 10 used both U. S. and Japanese packs, and 15 used various brands. The reasons for using only one brand are: users were satisfied with the brand and quality of the product delivered to them by their suppliers, and purchases could be made on a contract basis. Those using 2 or more brands gave such reasons as price factor, system of purchase by bids, easy ordering, and different brands handled by their suppliers.

As for consumption by style of pack, solid white meat tuna pack was by far the preferred style. Caterers were found using 100 percent solid white meat tuna, cafeterias and luncheonettes 97 percent, clubs and associations 90 percent. By regions, preference for solid white meat was heaviest in Chicago with 97 percent, followed by New York with 86 percent, and Boston with 83 percent. Consumption of solid light pack was heaviest in mass feeding establishments. The use of chunks in hospitals was noted, but the volume was insignificant. ("Suisan Keizai Shimbun," June 13 & 14, 1967.)

Texas Yard Builds Shrimp Trawlers for Export

U. S. boat builders rarely receive export orders for fishing vessels, but Rockport Yacht & Supply Co., Rockport, Texas, wins them for its shrimp trawlers and the freezer vessels that receive the shrimp. This is reported in the July 1967 issue of "Ocean Fisheries." The editors believe this export business is a tribute to the specialized shrimp trawlers developed by U. S. fishermen, designers, and builders for use in the Gulf of Mexico and more distant waters.

Perhaps the biggest surprise in Rockport's foreign business is that it started with 4 steel shrimpers ordered by Nippon Reizo K. K., the Japanese freezing and fishing company, for service in South American waters. The magazine states: "When one of the great fishery corporations of Japan, which is the greatest fishing boat builder in the world, buys boats in the United States, it's news. Also, it is because of the specialized character and proven effectiveness of the vessels for a particular form of fishing under certain conditions of sea and weather."

Rockport Has Built Many

Rockport has produced many other vessels for duty in Central and South America. It is believed that one of the largest U. S. operators, extending its operations into several parts of the world, expects to equip its Indian ocean operations with a fleet of steel shrimpers modeled after the "Irish Sea" built by Rockport in 1965. This vessel set a catch record for the Aransas Pass (Tex.) area on her maiden trip by landing 10,705 pounds of headed shrimp.

The Irish Sea is a 76 footer powered by a diesel working through a 6:1 reduction gear. She is said to have unusual stability and workability.

The freezer craft that receive the trawler catches on more distant fishing grounds are a distinctive feature of some Gulf of Mexico shrimping. Mainly, they are built along trawler lines, but they are equipped with specialized refrigeration facilities. Several recently built Rockport products have standard 72-foot trawler hulls and are powered with D 343 Caterpillar diesels.

OCEANOGRAPHY

Certain Sea Lanes to N. Y. Harbor and Delaware Bay Recommended

The U. S. Coast Guard and the U. S. Coast and Geodetic Survey have established recommended sea lanes at the approaches to New York Harbor and Delaware Bay. These sea lanes are printed in magenta on the current Coast and Geodetic Survey Charts numbered 1108 (Nantucket Shoals to Five Fathom Bank) and 1219 (Cape May to Fenwick Island Light); they will soon be printed on Chart 1215 (approaches to New York Harbor).

All charts showing sea lanes have this printed on them:

> "The sea lanes overprinted on this chart are RECOMMENDED for use by all vessels traveling between the points involved. They have been designed to aid in the prevention of collisions at the approaches to major harbors, but are not intended in any way to supersede or alter the applicable rules of the road. Buffer zones are intended to separate sea lanes and to be free of ship traffic, and should not be used except for crossing purposes. When crossing sea lanes and buffer zones, use extreme caution."

Many Vessels Already Used These Lanes

These recommended lanes actually are being followed by many vessels today--especially between Ambrose and Nantucket. This use affects both the safety and prospective rights of fishermen. Rule 26 of the International Regulations for Preventing Collisions at Sea says:

> "All vessels not engaged in fishing, except vessels to which the provisions of Rule 4 apply, shall, when under way, keep out of the way of vessels engaged in fishing. This Rule shall not give to any vessel engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels."

One of the many definitions of "fairway" adopted by admiralty courts is "water on which vessels of commerce habitually move." Although an admiralty court has not been asked to rule whether the New York or Delaware Sea Lanes are "fairways" within context of Rule 26, it readily appears that such a ruling would be made. Because the privileged status of fishing vessels is altered by the use of fixed sea lanes, such vessels should be extremely cautious when operating near these lanes. (U. S. Coast Guard, July 3, 1967.)

U. S. Oceanographic Expedition Investigates Underwater Mountain

The new oceanographic survey ship "Discoverer" of ESSA's Coast and Geodetic Survey conducted an oceanographic research expedition to a submerged mountain in the North Atlantic, midway between Bermuda and the Grand Banks off Newfoundland.

The submerged mountain is the Gregg Seamount, which rises 13,320 feet from ocean floor to within 2,880 feet of the sea's surface. The research involved operations on the seamount and in the immediate area.

The 303-foot, 3,800-ton Discoverer, the Nation's newest and most completely automated oceanographic research ship, departed from Boston July 17 for Gregg Seamount. She remained over the seamount for 3 days, then returned to her base at Jacksonville, Fla. She was scheduled to return a month later to recover instrumentation that was placed atop the submerged mountain.

The expedition is one of the most intensive investigations ever made of an ocean seamount. Among the ocean phenomena investigated were speed and direction of ocean currents, strange underwater waves, marine life migrations, and the seamount's effect on the underwater course of the Gulf Stream. Findings will be released later.

Most Detailed Survey of Long Island Sound Is Underway

The most detailed survey of Long Island Sound, the first complete one since the 1800's, is underway. It will cover the Sound's entire length, from New Rochelle, N. Y., to Mystic, Conn. The work is being done by the Coast and Geodetic Survey, Environmental Science Services Administration (ESSA), U. S. Department of Commerce. Previous surveys were more limited, conducted in selected areas to update nautical charts.

The survey is being conducted by a 17-man, shore-based, field party and the USC&GS "Whiting." It will take several years.

The field party is working westward along the Connecticut coast from Groton. The Whiting's operations are being conducted initially off Eatons Neck, Long Island.

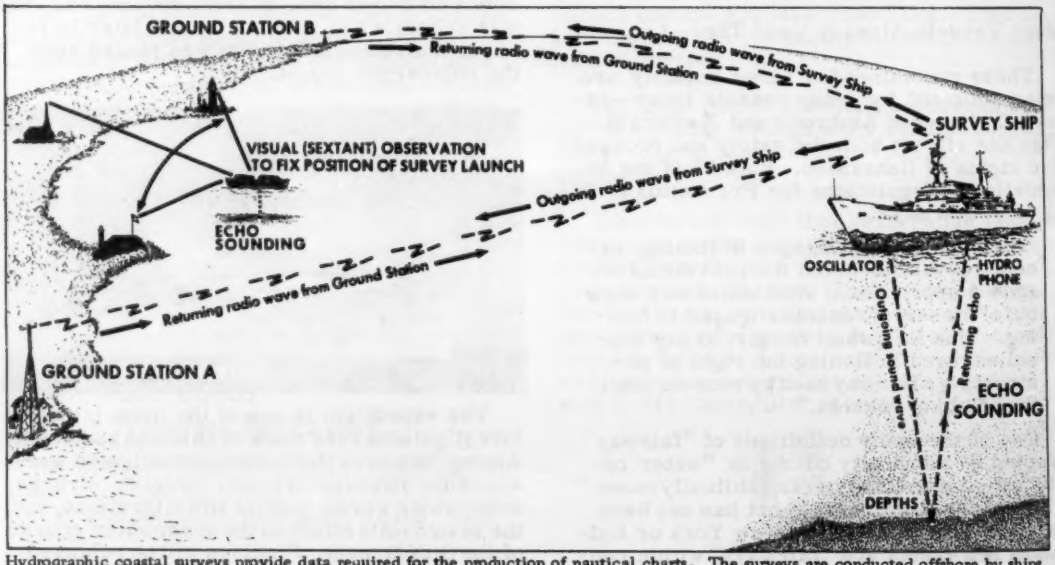
The project will provide the latest navigational information for new and revised charts essential to safe navigation of sea-going commerce and recreational boating. As surveys are completed, data will be incorporated in about 20 existing nautical charts. The surveys also will be used to produce 4 new charts beginning 1969.

How Project Is Conducted

The shore-based group seeks underwater changes made by man, wind, currents, and other causes. It locates navigational dangers: rocks, shallow areas, sand bars, and reported wrecks. It works from launches because the coastal waters are too rocky and shallow for ship operations.

The 162-foot, 760-ton, 36-man Whiting surveys the deep water of the Sound off Eatons Neck, Long Island, while her 30-foot launches work in the shallow waters of the north shore. The vessel is equipped with the latest automatic hydrographic data acquisition and plotting instruments. These compute the measured depths and locations of the ship and launches as the survey progresses and record automatically the data acquired.

In conducting the surveys, the Whiting's hydrographers and the field party use electronic echo sounders to measure and record depths. These instruments measure the time required for a sound wave produced in the vessel's hull to reach bottom and its echo to return. The return echo is recorded on a permanent graph at frequent intervals. This forms a continuous profile of the sea floor as the vessel traverses a predetermined course.



Hydrographic coastal surveys provide data required for the production of nautical charts. The surveys are conducted offshore by ships and inshore by launches. A ship's position is determined by sound waves from two electronic shore stations, while a launch maintains its exact position through sextant observations on three visual objects on shore. Depth recorders on ship and launch measure depths of the water by transmitting electronic impulses to and from the ocean bottom.

Navigating the vessel for thorough coverage results in the hydrographers obtaining the shape and slope of submerged elevations and depths. To position these submerged elevations and depths on nautical charts, the hydrographers determine the exact location of the moving vessel at selected intervals while depth soundings are being recorded.

When close to shore, 2 men on deck use sextants to eye and measure the 2 angles forming a 3-point fix of the vessel from 3 control stations on land whose exact positions were previously determined. In deep water, electronic positioning instruments are used.

New Nautical Chart Issued for Inland Waterway in Alaska

The Coast and Geodetic Survey has issued a new nautical chart for the entrance to the Inland Waterway, Alaska's major commercial waterway. The chart (8083) is the most detailed of the entrance to the waterway, which stretches about 430 miles to Juneau and Skagway. It covers the width of Clarence Strait, including Cholmondeley Sound and Skowl Arm.

The chart is the first of a new series expected to stimulate development of the State's fishing, lumber, mining, and petroleum industries. The development of Alaska's vast resources depends on its waterborne commerce--and on the nautical charts that guide shipping into its harbors.

Basic topographic and hydrographic surveys made by the Coast and Geodetic Survey in 1964 provided data for the new chart. It may be purchased for $1 from CGS nautical chart agents in Alaska, or by mail from the Coast and Geodetic Survey, 121 Customhouse, San Francisco, Calif. 94111.

Continental Shelf off Washington State and Alaska to be Studied

The Continental shelf off Washington State and under the Bering Sea, Alaska, will be studied this summer by marine geologists of the U. S. Geological Survey (USGS) and the University of Washington in a search for clues to heavy metals. According to these scientists, the sea floor off Washington--and in the area between Seward Peninsula, St. Lawrence Island, and the Yukon Delta in the Bering Sea--offer "promising targets for heavy metals resources."

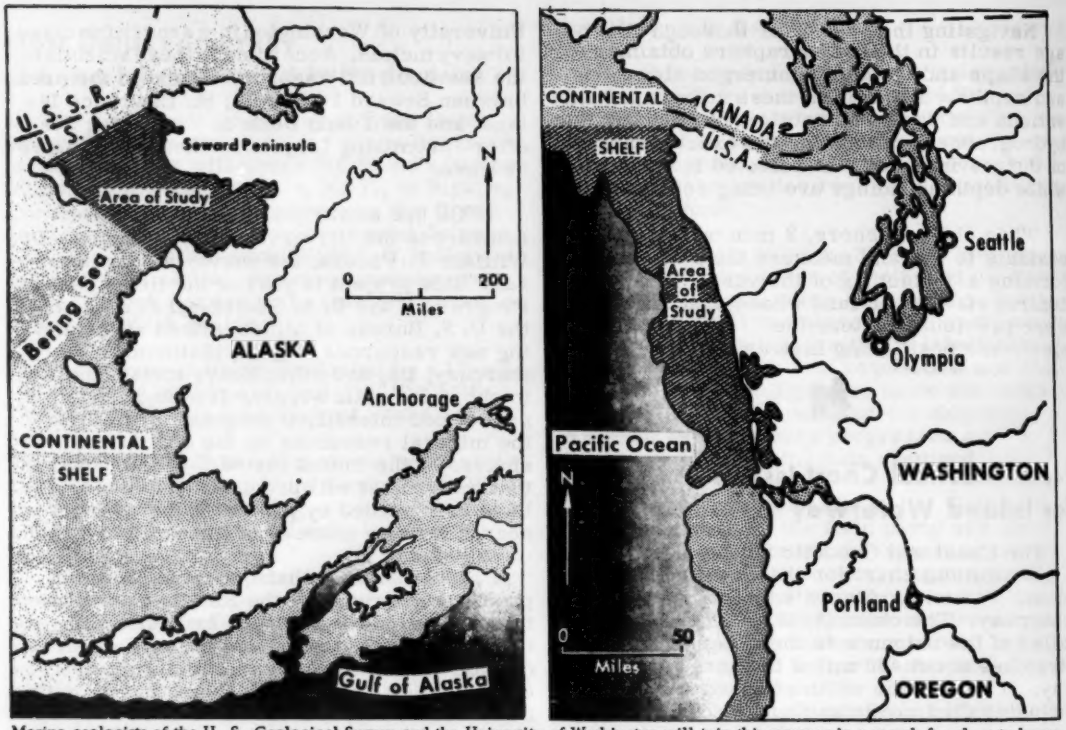
USGS has awarded a $185,000 research contract to the University of Washington. Dr. William T. Pecora, the Survey's Director, said "this project is part of the Heavy Metals Program of the U. S. Geological Survey and the U. S. Bureau of Mines, aimed at identifying new resources of gold, platinum, silver, mercury, tin, and other heavy metals that are in short domestic supply. It also constitutes part of our intensified program to evaluate the mineral resources on the continental shelves of the United States." He emphasized that the project will provide much basic geologic data needed by private industry in its search for new sources of minerals.

Dr. Pecora said that USGC has similar projects underway off the Pacific Coast States in cooperation with Scripps Institution of Oceanography of the University of California, Oregon State University, and the University of Alaska; off the Atlantic Coast States, with Duke University; and off the Gulf Coast, with Texas A & M College and Louisiana State University.

Study Offers Promise

Dr. Parke D. Snavely Jr., Chief of USGS' Office of Marine Geology and Hydrology, Menlo Park, Calif., said: "Although the oil industry has conducted an aggressive exploration program on the Washington shelf and adjacent land areas, little attention has been given to determining the minerals potential."

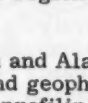
Dr. Snavely believes the Bering Sea studies hold particular promise. "On land around the Bering Sea," he explained, "rich stream and beach placers have been mined extensively for gold, tin, and platinum since the gold-rush days; for example, the raised beaches at Nome have produced more than $100 million of gold. The Bering Shelf has been repeatedly submerged as a result of changes in sea level. Consequently, sand and gravel deposits are present on beaches and in stream valleys in the submerged shelf area, and we expect to identify target areas likely to contain placer concentrations similar to those on land. In addition, the outer Bering Shelf is an area of



Marine geologists of the U. S. Geological Survey and the University of Washington will join this summer in a search for clues to heavy metals. "Target" area: the continental shelf off the coast of the state of Washington, and under the Bering Sea, Alaska.

possible petroleum potential and sampling will be done in this region around Pribilof Canyon."

The Washington and Alaska studies will involve geologic and geophysical studies, including acoustical profiling, magnetic surveys, and dredge and core-sampling. The studies will be conducted from the University of Washington's research vessel, "Thomas G. Thompson."



Growth of Boating Increases Need for Nautical Charts

The Coast and Geodetic Survey (CGS) says it may have to produce 237 new nautical charts during the next decade to meet constantly increasing commercial and recreational boating needs. During the past 125 years, it has produced about 830 nautical charts covering $2\frac{1}{2}$ million square miles of navigable waters. About two million copies of these charts are distributed each year.

CGS estimates that 83 new conventional charts and 154 new small-craft charts should be produced during the next 10 years to keep pace with the Nation's growth.

Types of Charts

Conventional charts are for use aboard ships where room for display and plotting is available. These range from large-scale harbor charts intended for navigating in harbors and narrow waterways and for anchoring, to small-scale sailing charts for offshore navigation between distant ports.

Small-craft charts are compact and specially designed for cockpit use. They also are valuable as hand-held copies on the bridge of large commercial ships. These accordion-folded charts direct skippers to docking facilities, supplies, and services. Printed on

the covers are tides, currents, symbols and abbreviations, and many helpful small-craft notes.

Besides preparing new charts, CGS must constantly modernize existing charts because currents, winds, tides, and man are continually changing shore and underwater features--and creating hazards to shipping. To find out the extent of these changes, surveys are conducted by hydrographic survey parties and by hydrographic survey ships.

Every CGS nautical chart contains the most up-to-date information required for safe navigation. Inventory stocks are hand corrected to show the latest information on shoal depths, aids to navigation, obstructions, controlling depths in channels, clearances for overhead cables and bridges, and other changes.

Surveyors For 160 Years

In 1807, President Jefferson heeded the appeals of early navigators and created CGS. Since then it has had the job of surveying the Nation's coastal waterways. The agency was instructed to make a survey of the coast, harbors, adjacent shoals, and off-lying islands; then, the coast extended only from Maine to Georgia.

CGS' first nautical chart was a stone engraving of Newark Harbor, dated 1839. By 1844, 169 charts had been issued. Production reached an annual output of over 50,000 copies during the Civil War.

Over the years, the need for up-to-date nautical charts has increased with the expansion of commercial shipping and recreational boating. CGS reported that in fiscal year 1965, 3,095 commercial vessels were involved in marine accidents resulting in losses of nearly $46 million; 623 vessels were grounded.

In recreational boating, where the number of craft has increased since 1950 from 3½ million to about eight million, CGS reported 3,912 marine accidents involving 5,036 recreational boats in 1964; losses were $5,171,600. Of these accidents, 280 resulted from groundings.

CGS nautical charts provide the navigator with the latest information. The charts are available from the Coast and Geodetic Survey (Attn: C44), Washington Science Center, Rockville, Md. 20852, or from its authorized sales agents.

Other CGS Material

CGS also issues other publications on navigation. They include:

(1) United States Coast Pilots

A series of books providing information important to navigators of coastal and intracoastal waterways. Subjects include navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities.

(2) Tide Tables

Predictions of the times and heights of high and low waters for every day for many important harbors. Methods to predict numerous other places are given in annual tide tables.

(3) Tide Current Tables

These contain advance information on currents, including daily predictions of times of slack water and times and velocities of maximum flood and ebb currents for some waterways, and differences to obtain predictions for numerous other places.

The Tide Current Tables cover Atlantic Coast of North America; Pacific Coast of North America and Asia.

(4) Tidal Current Charts

Each consists of a set of 12 charts that depict, by means of arrows and figures, the direction and velocity of the tidal current for each hour of the tidal cycle. The charts may be used for any year.

Another publication important to boaters--the Weekly Notice to Mariners--is prepared jointly by the Coast Guard, the Coast and Geodetic Survey, and the Naval Oceanographic Office (which publishes it). It provides necessary information to keep nautical charts and related publications up to date pending issuance of new charts or revisions. CGS catalogs list places where this free publication and other Government publications on boating may be obtained.

Foreign Fishing Off U. S. Coasts in June 1967

IN NORTHWEST ATLANTIC

Soviet: Fishing fleet operations continued on a massive scale during June. The number of Soviet fishing vessels increased rapidly to about 200 units from late May to mid-June but decreased to an estimated 175 vessels at month's end. The decrease probably was due to more intense Soviet fishing off Canada.

243 individual vessels were sighted, compared to 171 sighted during May 1967 and 161 in June 1966.

This June, the Soviet fleet on and near Georges Bank consisted almost entirely of medium side trawlers and numerous processing ships and supply vessels. In June 1966, over 60 factory stern trawlers and less than half the present number of side trawlers were fishing on Georges Bank. This June, most factory stern trawlers (estimated at over 60) fished off Canada.

Through June, the fleet was divided into several groups dispersed along 150 miles of the 50-fathom curve from south of Nantucket Island to the southeast slopes of Georges Bank.

The largest concentration (100-125 vessels) was found in a 30-to 40-mile area along the southeast part of Georges Bank (between Lydonia and Corsair Canyons) fishing at 30 to 50 fathoms. Moderate catches visible on deck were primarily herring; much of the catch was covered to protect it from the sun. Many trawlers were alongside huge factory base ships discharging catches.

Smaller groups of 20 to 30 vessels were 35 to 65 miles south and southeast of Nantucket Island. Moderate to light catches of fish were mostly whiting and herring, with some mackerel.

Polish: 16 vessels were sighted on Georges Bank and identified as 13 large side trawlers, one freezer stern trawler, and 2 supply vessels (arrived late in the month). These vessels were operating among Soviet fleets taking moderate catches of herring.

Recently, 2 Polish trawlers--"Sleza" and "Radwa"--tied up at the East Boston shipyard seeking fuel, water, and food. They had tried earlier to land at Gloucester but were denied entry by U. S. Coast Guard because of illegal entry without proper clearance. (See Poland, p. 48.) The arrival of the two supply ships should relieve some logistics problems of Polish vessels.

IN MID-ATLANTIC BIGHT

Soviet: None was sighted.

IN THE GULF OF MEXICO

Soviet: No vessel fished close to U. S. shores. There was no fishery on Campeche Banks off Mexico. Vessels in transit through Straits of Florida increased, however, presumably because of a new fishery Soviets started off Brazil's Rio Grande do Sol Province.

Cuban: State-owned fleet fished throughout Caribbean. The largest concentrations were near northern coast of Cuba and around Bahamas. Fishing on Campeche Banks was less intensive.

OFF CALIFORNIA

Soviet: A relatively large number (up to 22) of fishing and support vessels fished off California in first-half June. Most (14 to 20) were large stern factory trawlers which drifted south when fishing off Pacific Northwest was not good. They were supported by 1 or 2 supply vessels or refrigerated fish carriers and by 1-2 research vessels.

The main fleet concentration was south of Farallon Islands off San Francisco. Landings were mainly Pacific ocean perch, other bottom fish, and Pacific hake. Some of the best landings were as high as 50 metric tons a day. An area record was set on June 9 when the stern trawler "Tikhvin" of the Nakhodka Fisheries Combine caught almost 60 tons not far from the Farallons.

Fog prevented meaningful observation of fleet during second-half June.

OFF PACIFIC NORTHWEST

Soviet: During June, adverse weather hampered aerial and surface surveillance of foreign fishing. In early June, 90 Soviet fishing and support vessels were sighted off Washington and 1 off Oregon. By month's end, 68 were off Washington and 13 off Oregon.

Off Washington, the greatest effort and the best catches were between Grays Harbor and Columbia River. The best 1967 catch seen off Washington during a surveillance flight was on June 29: vessels appeared to be in fish, and hauls up to 40,000-60,000 pounds were noted--primarily hake with a few rockfish.

Off Oregon, fishing has been between Heceta and Yaquina Heads on Stonewall and Heceta Banks. Catches off Oregon were less than those observed off Washington and could be considered poor to fair; they consisted primarily of hake but more ocean perch and other rockfish were noted.

Research and exploratory vessels worked continuously off Oregon and Washington searching for concentrations of fish.

During June, fishermen and BCF agents observed vessels fishing where they had agreed not to fish. In the Pacific ocean perch restricted area between Columbia River and Grays Harbor, 2 vessels were observed fishing, one by U. S. fishermen, the other by a BCF agent aboard a Coast Guard vessel. A U. S. fisherman reported seeing 3 Soviet vessels 6-7 miles off Cape Sebastian. On 2 occasions, U. S. fishermen reported Soviet vessels had interfered with their fishing operations off Columbia River.

Japan: No vessels were seen off Coast. The stern trawler "Kirishima Maru" fishing off southern end of Vancouver Island presumably had moved north.

OFF ALASKA

Japanese: Nearly 600 Japanese vessels were fishing during early June, but with typical westward movement of salmon fleets the number dwindled to about 260 by month's end.

The Gulf of Alaska Pacific ocean perch fishery remained constant during June with 6 factory trawlers fishing primarily in the central Gulf. During most of June, 2 factory trawlers fished near Middleton Island, one factory trawler on Portlock Bank, and the rest on Albatross Bank. In late June, 2 trawlers fishing near Middleton Island moved to Portlock Bank, and 2 trawlers moved off Albatross Bank--one to Chirikof Island, and one along 100-fathom curve in western Gulf. These vessels were serviced by cargo ships and refrigerated transports.

Two factory trawlers fished for Pacific ocean perch south of Fox Islands in eastern Aleutians throughout June. During first half, 2 fished north of central and western Aleutians and, about midmonth, moved to central Bering Sea. About mid-June, 2 factory trawlers began fishing for perch south of Rat Islands in western Aleutians. Perch operations in central Bering Sea were conducted by 3 factory trawlers south of Pribilof Islands during June. About midmonth, perch fishery in central Bering Sea was intensified when 3 more factory trawlers began operations northwest of Pribilofs.

Two small factory trawlers, previously fishing for perch in Gulf of Alaska, began fishing for shrimp near Trinity Islands. Both Japanese and Soviets have fished shrimp there during previous years.

The level of eastern Bering Sea fish meal and oil fishery was increased from 4 factoryships and about 85 to 90 trawlers to 5 factoryships and 105 trawlers in early June. During most of June, 3 fleets operated on Bristol Bay "flats" east of Pribilofs while remaining 2 fleets fished north of Fox Islands in eastern Aleutians. All 5 fleets were catching primarily Alaska pollock; in addition to making meal and oil, they produced minced fish meat for fish sausage. In late June, area north of Fox Islands was abandoned; one fleet moved onto Bristol Bay "flats" near the 3 previously mentioned fleets, and the other fleet moved to west of Pribilofs.

The pattern of king crab tangle-net fishery in eastern Bering changed in June. In May, 1 of 2 fleets switched from Bristol Bay "flats" north of Alaska Peninsula to Pribilof area, the custom of previous years. In early June, however, the second fleet also shifted to Pribilofs where blue king crab are caught. The fishery was short-lived; by mid-June, both fleets had moved back onto Bristol Bay "flats."

A BCF agent visited both fleets during third week. He was informed that the blue king crab caught in Pribilofs were larger than king crab of Bristol Bay "flats" but were not as plentiful.

The combined pack of the two factory ships, on June 18, was reported as 70,944 24-pound cases, leaving 92,056 cases to be packed before Japanese reach their quota of 163,000 cases. Both fleets had been operating for $3\frac{1}{2}$ months and intend to finish about mid-September. With over half the season over, Japanese

will have to find more productive fishing to fulfill their quota.

During first-half June, the 2 vessels fishing king crab pots in the pot sanctuary north of Unimak Island continued operations. About midmonth, one vessel moved to Pribilofs to conduct experimental pot fishing for blue king crab.

As before, the 3 whaling fleets hunted whales well offshore, presumably along Aleutians and maybe into Gulf of Alaska, well outside heavily patrolled areas.

Salmon Fleet In 3 Groups

In early June, the 11 high-seas salmon fleets fishing southwest of western Aleutians divided into three groups. One group, composed of 2 fleets, moved into critical "corridor" between 180th meridian and 175° W. long., where mature Bristol Bay red salmon are normally abundant at that time and are particularly vulnerable to capture on the high seas. The second group, three fleets, also moved eastward but remained west of 180th meridian. The remaining 6 fleets remained centered southwest of Attu Island. By about midmonth, the 2 fleets fishing in the "corridor" area moved north into the Bering Sea just west of 175° W. long.; they were joined by one fleet that had been fishing just west of 180th meridian. The remaining 8 fleets began dispersing westward. By late June, all but 2 fleets were spread in a wide arc in the western Bering Sea and North Pacific closer to Soviet coast. Two fleets continued fishing about 200 miles southwest of Attu Island.

One longliner fished on traditional sablefish grounds north of eastern Aleutians, and one other longliner fished for sablefish in central Gulf of Alaska near Chirikof Island throughout June.

Soviet: The number of vessels declined to less than 40 by month's end despite increase in Pacific ocean perch fishing effort. This resulted from completion of their eastern Bering Sea king crab fishery and apparent withdrawal of their whaling fleets.

After a month's lapse, the Soviets resumed Pacific ocean perch fishing in Gulf of Alaska in late June. Six large stern trawlers appeared on traditional fishing grounds near Chirikof Island southwest of Kodiak, while one exploratory medium trawler operated near Middleton Island in central Gulf.

Perch fishing in western Aleutians was successfully resumed in mid-May. By early June, the fleet there centered principally on Tahoma Reef and Stalemate Bank and fished through June; it consisted of 30 vessels, including medium and large trawlers.

Perch fishing off eastern and central Aleutians was insignificant. The 1967 eastern Bering Sea king crab fishery ended with departure of last Soviet cannery on June 22. Two other canneries departed June 17 and April 26.

Soviet whaling fleets known to be working in the North Pacific apparently have withdrawn from the immediate Alaskan area. They are hunting far offshore as in past few years. Private airplane pilots reported seeing Soviet whale catchers in northern Bering Sea north of St. Lawrence Island in late June. These, presumably, were units of at least one whaling flotilla, consisting of a factoryship and about 12 catchers.

STATES

California

MACKEREL AND SARDINE
SITUATION IS POOR

The June report of the Resources Agency of California notes the plight of the sardine and mackerel fisheries. The Legislature authorized a 2-year moratorium on sardine fishing after about 30 years of sardine research and numerous warnings to the industry that the sardine population was endangered by overfishing.

As for mackerel, the report states: "Currently the Pacific mackerel fishery has declined to a seriously low level. Annual landings have dropped steadily since 1962 when 24,289 tons were taken. Last year only 2,244 tons were landed and the 1967 catch to date is only about 125 tons, far below the 1956-1965 ten-year-average of 5,698 tons for the January-June period. Numerous warnings have been sounded in the past concerning the future of this once great resource. The purse seine and lampara fleet was able to land only 10 tons of Pacific mackerel during June after spending about 1,300 hours scouting for fish in southern California."

Most of the June fishing effort was at Cortes and Tanner Banks and San Clemente Island., where about 95 percent of the 4,000 tons of jack mackerel landed was taken. The near-shore between San Pedro and San Diego was fished but nothing was caught.

Echo Sounder Reveals
Many Northern Anchovies

An echo-sounder survey of southern California and northern Baja California waters, completed June 9, showed northern anchovies the dominant species. "Extremely large numbers of small schools were found from Santa Monica Bay southward towards San Clemente Island." The densities were up to 1,200 schools per square mile. All the fish were large adults in advanced stages of spawning condition. School sizes were very small--most probably less than a ton.

Of the 3 surveys conducted this year in southern California, the last found the most anchovies. An inshore shift of the population took place since the survey in April, when the highest densities were found seaward of San Clemente Island. Anchovies were scarce elsewhere--especially in northern Baja California.

Louisiana

CENTENNIAL OF SHRIMP
CANNING IS CELEBRATED

The 100th anniversary of the commercial canning of shrimp was observed on July 12 at Grand Terre Island, Louisiana, near the site of the first canning of shrimp in 1867. The American Shrimp Canners Association and the Louisiana Wildlife and Fisheries Commission cooperated to observe the centennial.

Dr. Leslie L. Glasgow, director of the Wildlife and Fisheries Commission, reported progress in the studies at the Commission's laboratory at Grand Terre to see whether it is feasible to produce shrimp year round in captive ponds. Experiments show that brown shrimp develop as fast in ponds as in the open water, he said. There are 6 ponds at the lab stocked with baby shrimp that receive a controlled diet under optimum conditions of water level, temperatures, and salinity.

Marshes Important

Dr. Glasgow said: "We need to know more about stocking, methods to bring in the right food to feed the captive shrimp, more about the fertility of water." Louisiana marshes, once considered useless, are proving to be very important. Menhaden are 100 percent dependent on the marshes. Speckled trout spend most of their life and die near the marshes. He added: "All of our Nation's coastland people profit by what occurs in the marshes here at Grand Terre and at Grand Isle."

Emile M. Lapeyre Jr., president of the American Shrimp Canners, said that 1967 "is well on its way to becoming one of the best years in the industry's history." He suggested that Louisiana's vast marshlands could be used for mass production breeding grounds.

Alaska

GOV. HICKEL ORDERS BRISTOL BAY RELIEF STUDY

Gov. Walter J. Hickel ordered 9 state agencies in mid-July to move immediately to avert economic disaster in the Bristol Bay area following one of the poorest red-salmon catches. He directed state officials to prepare a report on projects that are needed to solve the present crisis and to put Bristol Bay on a firm economic foundation for the future. Gov. Hickel said the area's basic problem is the absence of a diversified economy, which is magnified by a poor red-salmon run.

With the run nearly over, the Bristol Bay red-salmon catch was 3,834,000 fish, compared with last year's 9,314,000 and a 16-year average of 7.8 million.

* * *

EDA FUNDS TO AID DILLINGHAM

The U. S. Department of Commerce's Economic Development Administration (EDA) has approved a $403,000 grant and a $248,000 loan to Dillingham, Alaska, to aid the fishing industry and to create new jobs. The funds will be used to construct a dock, cold-storage warehouse, quick-freeze facility, ice maker, and a water supply line. These will be used by the Western Alaska Cooperative Marketing Association, a group of 350 Alaska boat owners and fishermen.

In requesting the EDA funds, Dillingham officials said that the new facilities will enable local fishermen to freeze their catch, so they can fish for several species and extend the season beyond the usual 4 months. Job opportunities are expected to rise and the seasonal nature of present jobs to decline. The project is scheduled for completion in about 9 months after funds are made available.

* * *

1,000 SEA OTTER PELTS TO BE AUCTIONED

The fine pelt of the sea otter attracted Russian fur hunters to the Alaskan region as early as the 18th century. The animal's fur created such a demand that, during the Russian occupation, the sea otter narrowly escaped extinction. They were given complete protection in 1911 and their numbers increased greatly from Prince William Sound to the outermost Aleutians.

The Alaska Department of Fish and Game later saw that the sea otter had reached a point where a restricted number could be harvested regularly. It authorized experimental collection of the animal in 1962 and 1963 and 500 otters were harvested. Most of these pelts are in the raw state and are stored at the Juneau Cold Storage. Another 500 will be shot this summer and fall in preparation for a January auction. The average cost of harvesting 1,000 otters a year is an estimated $90 per pelt. Any profit would go to the State's General Fund.

* * *

FISHERY EXPORTS TO JAPAN INCREASING

The total dollar value of Alaska's fishery exports to Japan rose from $1,496,980 in 1965 to $4,167,351 in 1966. These figures indicate mostly the rapid growth of the salmon egg, herring roe, and herring-eggs-on-kelp industry.

Alaska's 1967 exports should be much greater, BCF Juneau predicts, with increased shipment of shrimp products to foreign receivers.

Maine

OCEAN STUDY URGED TO AID FALLING LOBSTER CATCH

The outlook for the lobster may be gloomy, Robert L. Dow recently told a Maine State Government Committee. Dow is research director of the Department of Sea and Shore Fisheries. Some scientists believe that if the declining lobster haul has been caused by colder water, then the state faces 20 more years of smaller catches. They believe that the coastal water, averaging about 45 degrees, will not start warming until the 1980s.

The state could do something about the problem by a serious program to study and develop ocean resources, Dow told the committee studying a bill that would put Maine into oceanology by setting up a Maine Ocean

Science Agency and a Maine Marine Institute. He supported the bill because it would help to coordinate the oceanographic efforts of the state, industry, and universities.

Study Effects of Heated Water

The Department of Sea and Shore Fisheries has begun to study the effects of heated water on lobsters. Dow said this was one area the proposed agency could help to evaluate. He added that colder water is spreading from Maine to New York. Although it may hurt the lobster, it may benefit other marine life. The lobster catch fell from a peak of nearly 24½ million pounds in 1957 to less than 20 million in 1966, but there was a proportionate rise in shrimp catch to a 1966 high of 3.8 million pounds. During this period, the water temperature off Maine fell from an average of 49 degrees to about 45.

Supporters of the bill would like to build an institute on Casco Bay to receive and transmit information and to direct oceanographic work.

* * *

STATE AIDS GROWTH OF SHRIMP MARKET

The production of shrimp in Maine has grown steadily since 1962, when it showed a substantial increase. In 1966, it reached 3.8 million pounds worth $531,000. The State's Department of Sea and Shore Fisheries estimates that the 1966-1967 season will hit a record 5-6 million pounds worth $660,000--with total primary wholesale value of $2 million.

The Department is aiding the development of the shrimp market. Its shrimp research program, now in its second year, seeks means to extend the season in order to increase production. It is evaluating the size of the resource in an attempt to improve industry's handling and marketing operations.

Its research activities include exploratory fishing, study of the shrimp population, life history of the shrimp larvae, effects of water temperature on survival, growth and reproduction.

How It Aids Industry

The Department's Promotion and Marketing staff has increased its efforts to publicize Maine shrimp and to help processors improve their merchandising methods and find new markets.

Department personnel are looking into by-product uses of shrimp. Shrimp meal from shells seems a good protein additive for poultry feed. Some form of shrimp meal may be used as trout feed in State hatcheries and private trout farms.

The Department has consulted a large marine-worm dealer on the use of small shrimp as bait for salt-water sport fishing. An effort to determine the market potential is being made along most of the Atlantic seaboard. There may be a market here for the smaller summer species of Maine shrimp. State officials believe that these efforts, plus modern fishing methods and processing, could make the shrimp industry a stable part of Maine's economy.

New York

STATE CONFERENCE WILL REVIEW OCEANOGRAPHIC RESEARCH ACTIVITIES

Governor Rockefeller announced on July 21 that a conference would be held on the Rockefeller University campus in New York City, Oct. 11-12, to consider the State's opportunities in using the ocean's "vast resources." The conference will be sponsored jointly by his office and the N. Y State Science and Technology Foundation. The Governor said Dr. Detlev W. Bronk, president of Rockefeller University, will be conference director.

Gov. Rockefeller noted: "The sea and its vast resources, its mysteries, its dangers, and, above all, its meaning to the future generations of mankind, present a new and exciting challenge. So far we have only scratched the surface in our understanding of the tides, the currents, the depths--to say nothing of the sea's potential as a food, chemical, oil and mineral supply."

New York universities and industries have conducted oceanographic research for years, but the conference will be the first coordinated appraisal of what they are doing.

The Governor said the conference should focus public attention on the necessity of more

research and study. Also, it should "emphasize the role state industries can play in the development and manufacture of vehicles, instruments and other equipment needed to conquer the sea."

Bronk and Lamont Observatory Credited

The Governor added: "I have asked Dr. Bronk and his committee to help plan New York's future role in this great undertaking, to explore every opportunity, to inventory the facilities available to our state and to recommend courses of action that will insure that we meet our responsibilities in this vital new field more effectively... .

"Our present knowledge of oceanography probably owes more to Dr. Bronk than to any other man. When Dr. Bronk was president of the National Academy of Sciences--a post he held for 12 years--he established the Academy Committee on Oceanography, which gave rise to the present great development of oceanography in our country and throughout the world."

Dr. Donald H. Davenport, executive secretary of the N. Y. State Science and Technology Foundation, said that the Federal Government does a great amount of oceanographic research, it also encourages state participation. This is because of the training and research work accomplished by universities in various states.

Dr. Davenport said that Columbia University's Lamont Observatory has "contributed over half of the scientific information and knowledge in the field of oceanography in this country through its work." The observatory has 3 oceangoing vessels at its disposal, including one based permanently in the Caribbean.

Between 200 and 250 guests, including Federal officials, scientists, and representatives of private industry, are expected to attend the conference.

Massachusetts

PROVINCETOWN FLEET IS BLESSED

A long line of brilliantly decorated fishing vessels sailed by MacMillan Wharf in Provcetown, Mass., on June 25 to receive the blessing of the auxiliary bishop of the Fall River Diocese. It was the 20th annual blessing of the fishing fleet and 10,000 persons were there to see it.

Fig. 1 - The Rt. Rev. James A. Gerrard, D. D., Auxiliary Bishop of Fall River, Mass., blesses the Provincetown fishing boats as they parade past MacMillan Wharf.

Fig. 2 - Parade of fishing boats--Provincetown blessing of the fleet. (Photos: Robert K. Brigham.)

Most of the vessels had been painted and tidied up just days before the ceremony, and the sun breaking through the fog heightened their brilliant colors. The vessels carried family and friends around the harbor--and on to picnics.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

"Bowers" Uses Lights and Recorders

The R/V "George M. Bowers" returned to Pascagoula, Miss., on June 22 after the last phase of an interrupted cruise that had been scheduled originally to operate through a full lunar cycle. Heavy seas damaged the outboard seine skiff beyond usefulness, and 2 weeks were required to obtain and modify a substitute vessel. (Cruise 79: Phase I (May 8-11) & Phase III (June 6-9, 13-22.)

Weather, sea, and turbidity varied greatly throughout the cruise but were generally poor. Fishing was conducted inside Chandeleur and Mississippi Sounds, Peridido and Pensacola Bays, and one night in the Gulf off Sand Island, Alabama. Best results were obtained in Pensacola Bay, where the water was clear most of the time, although bright moonlight prevented any but predawn assemblages. A purse seine set made there just before dawn yielded slightly more than one ton. Small ($1\frac{1}{2}$") anchovies, Anchoa sp., constituted 95% of the catch. A small number of larger (4") anchovies, along with scaled sardines, Harengula pensacolae, and Spanish sardines, Sardinella sp., made up the other 5%. Other catches ranged from 15 to 760 lbs. and the species composition was similar; however, first-year-class menhaden, Brevoortia patronus, were caught in one set. Numerous small schools of young menhaden were observed during daylight in Perdido Bay, Florida.

Tide and wind conditions made it necessary to set the seine away from the Bowers. Several combinations of lights were tested to attract, as well as to control, the fish schools. The most effective attraction system used was the combination of 3,250 watts mercury vapor and 13,000 watts incandescent. The schools were concentrated and controlled--once attracted by a combination of two 12VDC seal-beam above-water lights and a high intensity under-water photo lamp. The control lights were mounted in a skiff, which was drifted away from the Bowers during fishing operations to the pursing site.

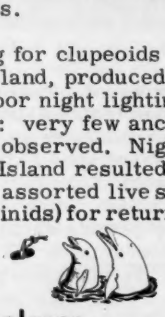
Phase II May 22-June 1

Recordings of predator swimming and feeding sounds were obtained for future use during experimental underwater sound guidance and holding studies with clupeoid (herring-like-fish).

Recordings were made using a hydrophone, preamplifier, and a portable tape recorder. Power was supplied by a portable 2.5 kw. gasoline-driven generator on deck, allowing the Bowers to lie dead in the water during all recordings.

Several sharks were attracted by chumming to within 50-100 yards of the vessel in 100 fathoms south of Mississippi River's Southeast Pass. One 6-foot silky shark (Carcharhinus floridanus) was hooked and its thrashing sounds recorded. A school of large jacks (Caranx hippos) was recorded for 15-30 minutes while the fish were hitting chum thrown overboard in 10-15 fathoms off the Delta. A recording was made as a 30-pound cobia (Rachycentron canadus) was captured by hook and line in 20 fathoms south of Horn Island. Inside Petit Bois Island, 40 porpoises were chummed near the Bowers and about 4,800 feet of tape were recorded of their feeding activities.

Night lighting for clupeoids in 20 fathoms, south of Horn Island, produced only squid. Ship Island Harbor night lighting also had limited success: very few anchovies and no predators were observed. Night lighting inside Petit Bois Island resulted in the capture of 2,000 to 3,000 assorted live small fish (the bulk small atherinids) for return to the laboratory.



"Oregon" Explores Eastern Caribbean

The R/V Oregon returned to St. Simons Island, Georgia, on June 15 after a 39-day cruise in the eastern Caribbean Sea (Cruise 118, May 8-June 15). Objectives of the cruise were to continue seasonal exploratory fishing coverage in the northeastern Caribbean Sea with emphasis on a snapper survey of the Continental Slope, tuna trolling tests, and deep-water shrimp explorations.

For tuna, trolling lines were maintained during all daylight steaming hours. Slow-trolling transects were conducted along the island banks from the U. S. Virgin Islands to

BCF research vessel Oregon. (Photo: F. Nudi)

the northern banks of Montserrat, British West Indies. Eight trolling lines were fished during the slow-trolling transect operations at an average vessel speed of 5 knots. The total trolling catch: 245 blackfin tuna (Thunnus atlanticus), which weighed 1,346 pounds and averaged 6½ pounds each; 47 little tuna (Euthynnus alletteratus) weighing 197 pounds; 24 skipjack tuna (Katsuwonus pelamis) weighing 116 pounds; 3 yellowfin tuna (Thunnus albacares) weighing 57 pounds; and other fishes.

Forty-nine tuna surface school observations were made: 23 blackfin tuna schools, 7 skipjack tuna schools, 5 little tuna schools, 3 mixed yellowfin with unidentified tuna schools, 6 mixed blackfin and skipjack tuna schools, and 5 unidentified tuna schools. School sizes ranged from very small to 200 tons or over. These schools were sampled with trolling gear at slow speeds with varying results.

Snapper Handlining

Exploratory snapper fishing was conducted with hand lines rigged on mechanical fishing reels at 12 stations along the steep slope from the Virgin Islands to Nevis Island.

Fishing depths averaged 75 fathoms (range 30 to 115 fathoms) and fishing time averaged 5 hours per station using 4 to 6 lines.

Areas of promising silk snapper fishing potential were located along the outer shelf zone north of the Virgin Islands and the bank edge north of Anguilla Island, W. I. Very poor catch rates were found on Barracuda Bank southeast of Tortola Island, at Sombrero Island, and at Nevis Island.

Catches of snapper totaled 186 yelloweye snapper (Lutjanus vivanus) weighing 560 pounds; 105 blackfin snapper (Lutjanus buccanella) weighing 292 pounds; 3 black snapper Apsilus dentatus) weighing 15 pounds; and 1 vermilion snapper (Rhomboplites aurorubens) weighing 1 pound. Other species of fish totaling 676 pounds were taken with the handlines.

Deep-Water Shrimp Trawling

Thirteen (13) nighttime deepwater trawling stations were occupied using 40- and 65-foot flat trawls. Shrimp catches consisted of small amounts of scarlet prawns (Plesiopenaeus edwardsianus), royal-red shrimp (Hymenopenaeus robustus), striped shrimp (Plesionika longipes, Penaeopsis megalops, and Aristeamorpha foliacia). The royal-red shrimp were the first to be captured in the Lesser Antilles by the Oregon.

Commercial scale trawling efforts (8-hour tows) were frustrated by heavy catches of the giant deep-water isopod, Bathynonus giganteus, which attacked and consumed most of the catch in the cod end of the trawl.

Depths fished ranged from 130 to 460 fathoms. Bottom temperatures ranged from 49° to 66° F.

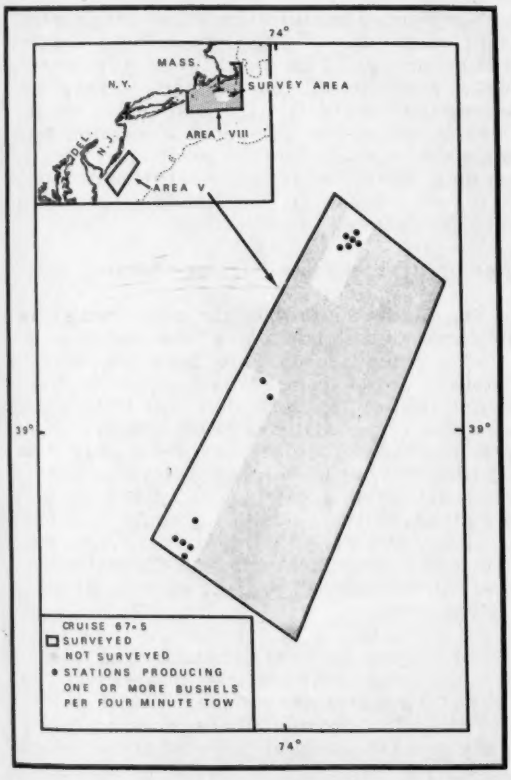
"Delaware" Finds More Clam Beds off Massachusetts

BCF's Delaware recently made excellent catches of mahogany quahog clams during an exploratory fishing cruise off the southern side of Cape Cod (Cruise 67-5, June 6-30). Highest production rate was 20 bushels by hydraulic jet dredging in a 4-minute tow.

The most significant result of the cruise was the finding that concentrated beds of

relatively unfished mahogany quahogs occur all the way from Chincoteague to Martha's Vineyard.

The 25-day surf clam (Spisula solidissima) survey cruise was carried out in Area V off the southern coast of New Jersey, and in Area VIII seaward of Cape Cod and south of Nantucket Sound. Catches of surf clams varied from 0 to 3.5 bushels per 4-minute tow in Area V, and from 0 to .9 bushels in Area VIII. Exceedingly large catches of ocean quahogs (Arctica islandica) were taken from both areas. Further tests were also made on an electrically driven, submersible pump dredge.



Three of the cruise days were used by biologists of BCF's Oxford (Md.) Biological Laboratory to fish about 70 stations to obtain surf clams for marking and planting; they also searched for previously planted marked clams off Cape May, New Jersey, and Blackfish Bank.

Survey Procedure

Tows of 4-minute duration were made at the intersection of perpendicular sets of grid lines spread about 1 mile apart. Some sections in each area were bypassed because of unfavorable bottom conditions; parts of the Area VIII bottom, east of Cape Cod and south of Nantucket Island, were found to be too rocky for dredging, and the central part of Area V is crossed by 3 transatlantic telephone cables.

Salinity and bottom temperatures were taken at selected survey sites.

Results

Of the 204 catches in Area V (exclusive of the 70 stations fished for Oxford) 77 contained no surf clams, 114 catches varied from one surf clam to 1 bushel, and 13 tows produced catches of 1 bushel to 3.5 bushels. Ocean quahogs were taken in most tows; catches ranged from 0 to 2,200 quahogs (about 16 bushels). Thirty-one tows produced catches of 500 or over, ranging from 512 to 2,200 quahogs.

Of the 366 catches in Area VIII, 300 contained no surf clams and 66 varied from one clam to 56 (about 1 bushel); no tows produced catches over 1 bushel. A few clams were taken off Cape Cod, but too few stations were fished to support an estimate of the surf clam population. South of Nantucket Bay, indications were that sparsely populated surf clam beds existed in the shoal water south of the Island--but not to the westward in deeper waters, or other inshore waters. Ocean quahogs were taken at 253 survey sites. Catches varied from 0 to 3,000 quahogs (about 20 bushels), most taken in sediments of soft, silty, sand. They were generally absent in catches from inshore and deeper offshore waters. Fourteen tows produced more than 500 quahogs each.

Size

The predominant size group of surf clams caught in both areas was between 5 and 7 inches. Many exceeded 6 inches within this length range. In both areas, only a few clams less than 4 inches long were taken.

In Area V, the size range of the ocean quahog varied mostly between 3 and 4 inches. However, quahogs in some catches exceeded

4 inches, with a few reaching about 5 inches. Generally, the average size of Area VIII ocean quahogs was less than Area V's, with only a few exceeding 4 inches. Some tows produced small quahogs (less than 3 inches).

Shells

Surf clam shells, along with other shellfish species common to Area V, were taken at most sites fished in the area. In Area VIII, very few tows produced sizable amounts of shells. Some sections of heavy quahog concentration and others of dense clam population produced shells in limited amounts; this reflects the limited accumulation of shells throughout the area.

"Kaho" Completes 6-Year Study of Lake Michigan

BCF's R/V Kaho completed a 24-day exploratory fishing cruise in Lake Michigan and Green Bay on June 29 (Cruise 42). This cruise was the last in a series of 22 in Lake Michigan primarily devoted to analyzing the bathymetric distribution and seasonal availability of various fish stocks. During the 6-year study 1,446 drags were made, mostly with a standard 52-foot headrope sampling trawl.

The Kaho's crew completed these objectives during multipurpose Cruise 42: (1) located alewife concentrations at a time of year when they were difficult to capture with a bottom trawl, (2) surveyed shoal waters (5 fathoms or less) of southern Lake Michigan to determine the availability of carp, suckers, and yellow perch stocks, (3) conducted several deep-water drags with small-mesh trawl to test initially the potential commercial availability of sculpins, (4) conducted several drags at each station for bathymetric distribution analyses and population studies on chubs, and (5) monitored the Green Bay trawling stations to compare alewife abundance with 1964 and 1965 exploration data.

Cruise Highlights

Among cruise highlights were observations of the extensive alewife mortality throughout the lake. This die-off is widespread and was observed everywhere but in the extreme northern portion of the lake; all size classes of fish are involved. Catches of alewife in the open lake and Green Bay were higher than the June cruises of 1964 and 1965; 105 fin-clipped lake trout ranging from 5.3 to 19.0 inches were captured. Trout were most concentrated in depths less than 15 fathoms. Over 91% of the 105 trout were taken between 5 and 15 fathoms, and 49.5% at 10-11 fathoms. Initial tests with the shrimp trawl for sculpin evaluations were encouraging. Excellent catches of young yellow perch were netted in Green Bay.

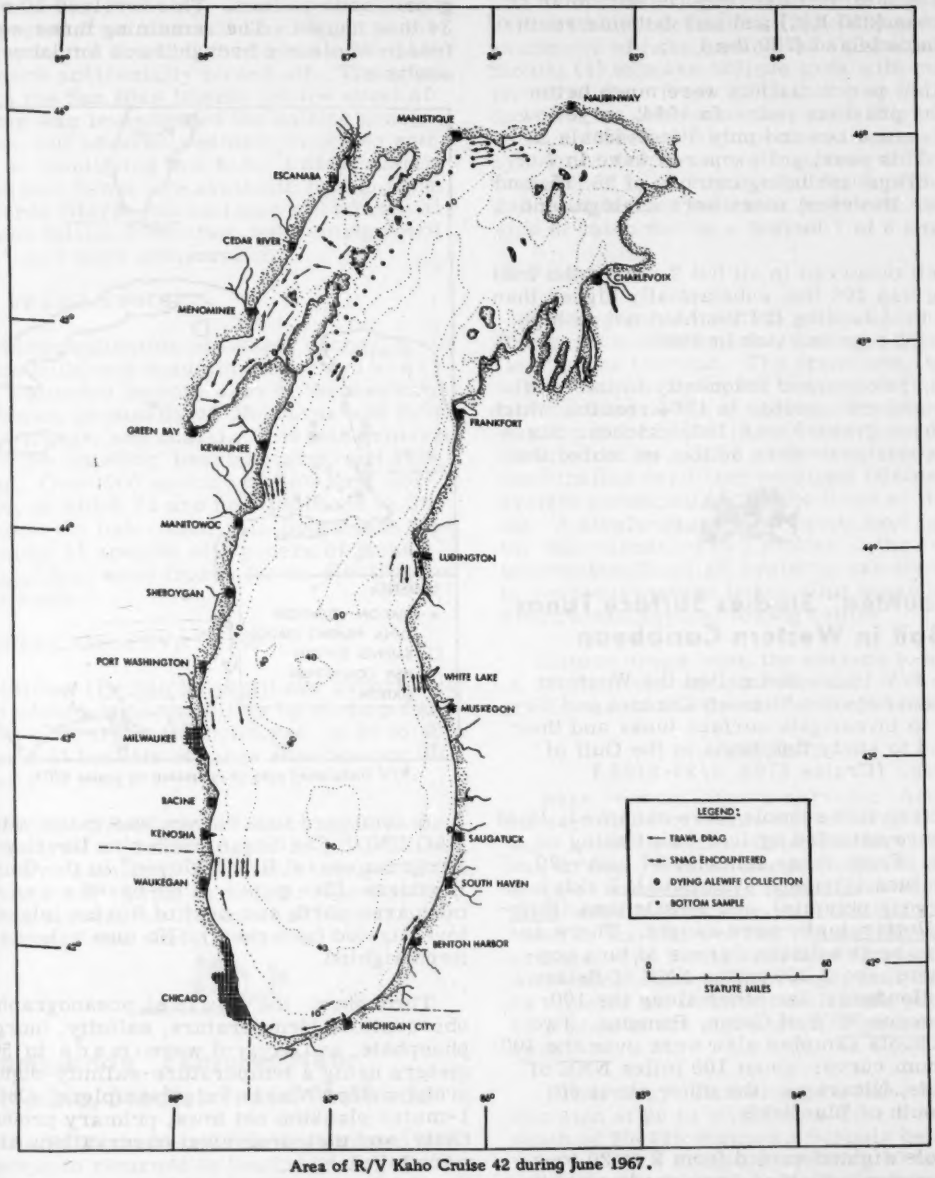
Fishing Operations

Sixty-three exploratory trawl drags were completed using the standard fish trawl (52-foot headrope). Two trawl drags were completed with a small-meshed shrimp trawl to determine the availability of sculpins. Drags were 30 minutes long, except 18 terminated early due to rough bottom conditions, snags, set nets within the area of operation or limited trawling area. Depths fished ranged from 3-65 fathoms.

Fishing Results Lake Michigan (June 6-22)

Trawl catches on the lake's eastern shore indicated alewife concentrations could be located in a depth range from 5-12 fathoms. Catches ranged from 400 pounds per drag at Benton Harbor to 1,300 pounds at 10 fathoms off White Lake. Catches along western shore were typically moderate. However, based on a 5-minute drag in Buffington Harbor, between the piers, a catch up to 1,200 pounds in a standard 30-minute drag would have been possible. One drag, 5 fathoms off Waukegan, produced 800 pounds. Off Seul Choix Point, good catches (up to 700 lbs.) were made in 6-10 fathoms.

Throughout the areas monitored in Lake Michigan, significant catches of alewives (over 500 pounds) were made in water not exceeding 12 fathoms. Chubs were not taken in any great quantity on the east shore except 2 drags that yielded 160 and 200 pounds off Ludington and White Lake, respectively, at 10 to 12 fathoms. Fair catches of chubs were taken along the western shore with the best catch 200 pounds at 25 fathoms off Waukegan. Smelt were sparse in southern Lake Michigan; however, a good landing of 150 pounds was made in 10-11 fathoms off Seul Choix Point. Eighty-four trout totaling 54 pounds were taken in Lake Michigan.



Area of R/V Kaho Cruise 42 during June 1967.

Fishing Results Green Bay (June 23-27)

Catches of alewives in Green Bay were better than during any previous June cruise. The best catch in 1964 was 600 lbs.; the average was 276 pounds. In 1965, the best catch was 950 lbs. and the average 241 pounds. On cruise 42, three landings were 1,000 lbs. or better; the best was 1,450 lbs. and the average 361 pounds. The best area was in 3-5 fathoms in the Bay's extreme southern portion. Good landings were made elsewhere

at 4 fathoms: in Little Bay De Noc north of Gladstone (850 lbs.) and in 3 fathoms south of Chambers Island (750 lbs.).

Yellow perch catches were much better than any previous year. In 1964, no yellow perch were taken and only 3 individuals in 1965. This year, yellow perch were in 7 of the 23 drags, including catches of 50, 75, and 100 lbs. However, most were sublegal and averaged 6 to 7 inches.

Smelt occurred in all but 2 drags; the best landing was 200 lbs, substantially higher than 1964's best landing (21 lbs.) but not as high as the 480 pounds catch in 1965.

Suckers occurred frequently in the trawl in amounts comparable to 1964 results, which were much greater than 1965 catches. Six catches this year were 50 lbs. or more; the best was 100 lbs.

"Undaunted" Studies Surface Tunas and Bait in Western Caribbean

The R/V Undaunted sailed the Western Caribbean between Yucatan Channel and Colombia to investigate surface tunas and their bait, and to study fish fauna in the Gulf of Honduras. (Cruise 6703, 3/29-5/25.)

Thirteen fish schools were observed; 10 of these were sampled by live-bait fishing or trolling. From these schools, 34 tuna--29 blackfin tuna (Thunnus atlanticus), 2 skipjack (Katsuwonus pelamis), and 3 little tuna (Euthynnus alletteratus)--were caught. There appeared to be two distinct areas of tuna concentration: about 100 miles NNE of Belize, British Honduras, the other along the 100-fathom curve WSW of Colon, Panama. Two other schools sampled also were over the 100-100-fathom curve: about 100 miles NNE of Bluefields, Nicaragua, the other about 60 miles south of Bluefields.

Schools sighted varied from 2 to 20 tons. All tuna schools sighted were predominantly blackfin (with a few scattered skipjack in one school). Individual fish ranged from 3 to 8 pounds.

Two schools were sampled for length, weight, sex, stomach content, muscle tissue, gonad, and eye lens. This involved 20 of the 34 tuna caught. The remaining tunas were frozen whole and brought back for laboratory analysis.

R/V Undaunted area of operation on cruise 6703.

A combined tuna survey was made with the FAO UNDP Caribbean Fisheries Development Program vessel R/V "Alcyon" in the Gulf of Honduras (See p.38.) A 60-by-60 square mile area north and west of Roatan Island was investigated (see chart). No tuna schools were sighted.

Throughout the cruise, oceanographic observations (temperature, salinity, inorganic phosphate, and oxygen) were made to 500 meters using a temperature-salinity-depth probe and/or Niskin water samplers. Oblique 1-meter plankton net tows, primary productivity, and meteorological observations also were taken.

BAIT FISHES STUDIED

Bait fishes were observed in useful quantities in two locations. Pilchards (Harengula sp.) were obtained at Porto Bello, Panama. Although this bait seemed strong, it did not

survive well. Probably, this was due to being transported from where it was caught to the ship, or to the fact that the lights in the bait tank were accidentally turned off. The area around the San Blas Islands off the coast of Panama was investigated for baiting possibilities, but adverse weather prevented sampling or identifying this bait. Useful quantities of bait fishes are available in this area. Pilchards (Harengula sp.) also were taken at Banacca Island, Honduras, but seining conditions there were unfavorable.

FISH FAUNA STUDIED

A large collection of fishes, exceeding 400 gallons bulk, was made in the previously little-collected inshore area of the western Caribbean, primarily off Honduras and British Honduras (see chart). This was achieved by bottom trawling, beach seining, and skin diving. Over 300 species of fish were collected, of which 75 are new additions to this laboratory's fish collection. Specimens representing 11 species of 8 genera of jacks (Carangidae) were frozen for an electrophoresis study.

GENERAL OBSERVATIONS

Scallops (Pecten laurenti) are reported to be in commercial quantities by shrimp fishermen off Caratasca, Honduras, in 30 to 40 fathoms (2 bushels of large scallops per 30 minutes of small trynet trawl).

Seventy-five blackfin tuna being held for shipment in a freezer locker on Bonacca Island were sampled. The fish averaged 77 cm. in length and 18 lbs. in weight. The fish had been caught off the NE coast of Honduras by handlining from shrimp vessels.

"Commando" Explores Near Columbia, Studies Trawl Methods

The BCF-chartered research vessel M/V Commando returned to Seattle on July 2 after a 19-day cruise off the Washington and Oregon coasts (Cruise 14).

The Commando's objectives were: (1) to determine the susceptibility of deep-water stocks of Pacific ocean perch and sablefish to capture by midwater trawling methods--and to compare these results with previous bottom-trawl operations; (2) to measure the abundance of hake around the Columbia River mouth; (3) to make oblique tows with midwater trawl gear from 400 fathoms to the surface; (4) to determine the feasibility of a combination depth-temperature telemetry system in deep water, a headrope-mounted transducer to determine net depth off bottom, and a catch-load indicator to determine the size of catch during a tow.

The Gear

Fishing was conducted with a $2\frac{1}{2}$" mesh Universal midwater trawl having a $\frac{1}{2}$" mesh liner in the cod-end. The trawl was fished with aluminum hydrofoil doors and $\frac{5}{8}$" electro-mechanical trawl cables. Trawl depth was monitored by a 10 x 10 cm. transducer mounted in the center of the headrope, and a combination depth-temperature telemetry system connected to the headrope at the wingtip. A strain-gauge-type catch-load indicator was connected to a ribline in the cod-end. Information from all systems was transmitted to read-out meters in the pilot house via the electro-mechanical towing cables.

Sixteen drags from the surface to a depth of 360 fathoms were made, most in the area contiguous to the Columbia River mouth.

RESULTS

Hake reconnaissance surveys: Acoustical surveys to detect midwater schools of hake were conducted from Cape Flattery, Washington, to Cape Mears, Oregon, outside the commercial hake fishery. When hake concentrations were located, the information was relayed to the commercial boats. No hake schools were located north of Grays Harbor. A 40-minute tow in light sign, near bottom at 26 fathoms off Destruction Island, produced 50 pounds of the euphausiid, Thysanoessa spinifera.

From Grays Harbor south, hake were quite common at 25 to 90 fathoms over a bottom depth of 25-125 fathoms. Schools below 50 fathoms were always more than 10 fathoms off bottom and scattered. The maximum catch in these schools was 2000 pounds in a 1-hour tow. Catches of 2-3 tons were observed taken by Soviet pair-trawlers (in pair-trawling, 2 SRTs tow one midwater trawl) fishing on this scattered sign. Very heavy signs were located near bottom off Tillamook

Bay, Oregon, at 35-50 fathoms. A 45-minute tow in this sign produced 15,000 pounds of hake. Observations of hake stomachs from this catch indicated these fish were feeding primarily on euphausiids.

Pacific ocean perch and sablefish explorations: Considerable effort was made sounding for possible schools of Pacific ocean perch and sablefish near bottom at 85 to 300 fathoms off Oregon and Washington. Except for a slight show south of the Astoria Canyon, in 85 fathoms, no schools were located. A 40-minute tow in this sign yielded 350 pounds of yellowtail rockfish (Sebastodes flavidus). These fish averaged 48 cm. in length and were feeding primarily on lanternfish. Because fish signs could not be located, a few tows were made just off bottom in areas where perch have been found on past surveys. These tows produced less than 100 pounds of fish per hour; catches of ocean perch and sablefish were less than 15 and 50 pounds per hour, respectively. It is not known whether the small catches were due to a low abundance of fish, or inability of the gear to take them.

Other sampling: Two oblique tows were made at night southwest of the Columbia River mouth over deep water, from 100 and 360 fathoms to the surface. Catches were disappointingly small: only a few lanternfish and sergestid shrimp. It is suspected that escapement through the $2\frac{1}{2}$" mesh of the trawl was partly responsible.

Samples of fish were frozen for radiological analysis by the Laboratory of Radiation Ecology at the University of Washington. (The Commando was chartered from the university.) Additional samples of bottomfish were frozen for pesticide residue analysis by BCF's Seattle Technological Laboratory.

Gear Observations: The combination depth-temperature telemetry system functioned satisfactorily to 360 fathoms. The headrope transducer also performed satisfactorily, but due to length of electro-mechanical cable (600 fathoms), sensitivity was reduced. It was sometimes difficult to observe the footrope. The bottom could be readily detected whenever the headrope was less than 30 fathoms off bottom. Using the headrope transducer, the trawl's vertical opening was found to be 40-50 feet at the center. Performance of the catch-load indicator was partially hampered by large swells, but it still was possible to detect an increase in the load created by an 11,000-pound catch.

Twin-bag Shrimp Trawl Successful in Alaskan Tests

Means of reducing unwanted fish in shrimp catches are being investigated by BCF's Juneau Exploratory Fishing and Gear Research Base with a Dutch twin-bag trawl. The Dutch trawl has an upper and lower bag. It works on the principle that bottomfish enter the lower bag while shrimp enter the upper bag.

Limited test fishing with a modified version of the trawl in Kalsin Bay, Kodiak Island, were encouraging: no shrimp were captured in the lower bag, and no bottomfish, crabs, or debris in the upper. Further test fishing will be done after the trawl is modified to include improvements suggested by the earlier tests.

Universal Trawl Catches Many Pacific Hake

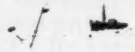
"Universal" trawls made excellent catches of Pacific hake in the several weeks they have been used in the commercial fishery out of Aberdeen, Wash. The trawl was designed by BCF's Seattle Exploratory Fishing and Gear Research Base.

Captains using the "universal" consider it superior to all "Cobb" pelagic trawls formerly used in this fishery. The new trawl is easier to tow and handle because it uses much less web than the Cobb. Sturdily constructed, it is holding up well during heavy fishing. Several individual hauls were over 25 tons, and one catch exceeded 40 tons of hake.

Detachable Trawl Cod End Works Well

A detachable cod end developed from a BCF research contract worked well in recent tests of a $\frac{1}{3}$-scale model operated from a

small dragger out of Gloucester, Mass. The main feature of this net modification is a pair of "nesting" collars, one on the net and the other on the cod end. A cod end filled with fish can be detached; then an empty cod end can be set in place by means of an endless line extending from the vessel through the net and thread back to the boat. The empty cod end is threaded through the net to the attaching collar; this can be done before the filled cod end is retrieved. This system would eliminate the need for frequent hauling back of the entire net to empty catches on deck. An extension of the contract to include construction and commercial testing of a full-scale model is now being considered.



Drift Bottles Used in Sea Surface Research

BCF's Tropical Atlantic Biological Laboratory in Miami, Florida, has successfully used drift bottles and ships of opportunity in research on sea surface conditions in the Caribbean Sea and western tropical Atlantic. John Brucks directed the operation. Returns from drift bottles released on 4 cruises of the R/V "Undaunted" this year have been encouraging.

Of 1,532 bottles released, information from 137 (8.9 percent) has been returned from points in the Antilles, the Caribbean coasts of South and Central America, and from the U. S. Gulf and Atlantic coasts. One Grace Lines vessel and 2 vessels of the Blue Ribbon Lines, Ltd. are collecting sea-surface salinity samples and temperature data in the Caribbean Sea on a twice-monthly basis. Blue Ribbon ships are taking samples in each major pass of the Antilles Arc, thereby providing seasonal coverage to study the surface flow into the Caribbean.

Demonstrate Electro-trawl System for Shrimp

The electro-trawl system for fishing shrimp, developed and tested by BCF Pascagoula, was demonstrated on June 27 to a Florida investment group. A single test-haul yield was 10 pounds of brown shrimp with the electro-trawl gear, compared to a $\frac{1}{4}$-pound catch of brown shrimp for a test haul with standard trawl gear.

The investment group reportedly plans to produce the electro-trawl gear for shrimp on a commercial scale.

Yellowfin Tuna See Better Than Tunny or Skipjack

Fish in water share a disadvantage with man: They can't see very well. Eugene L. Nakamura, fishery biologist at BCF's Biological Laboratory, Honolulu, has measured the visual acuity of 3 species of tunas: the little tunny, Euthynnus affinis, the skipjack tuna, Katsuwonus pelamis, and yellowfin tuna, Thunnus albacares. Nakamura says that none of them can see a fishhook more than a few feet away.

Nakamura's is one of several studies of the sensory capacities of tunas being conducted at the Laboratory in Honolulu. The researchers hope that investigations will provide clues to better tuna catches.

Little tunny, or kawakawa, is not commercially important. The yellowfin tuna is caught in Hawaiian waters by longlines, which fish in deep waters; it is taken in great quantities off the west coast of the Americas by the Californian fleet. The skipjack tuna, mainstay of the Hawaiian catch, has been estimated to be the most plentiful of all tunas. Much of the Honolulu Lab's work is designed to bring the skipjack tuna resources of the central Pacific Ocean into production.

Yellowfin Best in Perceiving Elements of Pattern

Nakamura found some time ago that the little tunny does not see as well as the skipjack tuna. Now he has learned that the yellowfin tuna far exceeds both other species in its ability to perceive separate elements of a pattern. He trained the fish to repond to projected patterns in a tank. Vertical stripes meant food, horizontal stripes meant punishment. By decreasing the contrast between the patterns and the background, he found the threshold at which the fish could distinguish between the two.

At very low luminances, he discovered, all 3 species performed much the same. But as the patterns were made brighter, the yellowfin tuna quickly displayed the keener eyesight.

While it is improbable that the tunas find their food by sight alone, Nakamura says, there can be no doubt that the sense does play an important part in food search, particularly in the last moments when the fish seizes its prey.

Fraction of Second to Act

Tunas swim continuously. Because they do not see very far, they have only a fraction of a second or two to accept or reject a fishhook or dodge a net. Nakamura says that a yellowfin tuna about 20 inches long (which would be a very small, young yellowfin, for they grow to as much as 7 feet long) swims at a speed between 3.5 and 12 miles per hour while feeding. It can see a fishhook such as that used on longlines at a distance of about 9 feet. That means it has at the most about one second to seize or avoid the hook. The smaller skipjack tuna and the little tunny have a little more time.

Nakamura suggests that silvery bait rather than dark bait will maximize the distance at which a baited hook can be seen by fish in deep water. Clear synthetic fibers in nets reduce the contrast between webbing and background--and enhance the likelihood of catching fish.

The various tunas carry distinguishing marks on their bodies. When they are feeding, yellowfin tuna display narrow stripes on their sides. Other yellowfin tuna can distinguish these stripes, which could be used to signal the presence of food about 15 feet away. The smaller tunas carry more pronounced markings. A skipjack tuna would be able to recognize the feeding coloration of another skipjack at about 40 feet.

Film Behavior of Tuna Bait

Robert Iversen and Reginald Gooding of BCF Honolulu have filmed the behavior of nehu in holding tanks with and without the presence of predators. They have begun to film a second species, Tilapia macrocephala, under the same conditions. The holding tank was painted dark blue to simulate oceanic conditions. The films confirm the difference in diving behavior of these 2 species.

Without predators, the nehu swam leisurely towards the bottom at a diving angle no greater than about 20°, usually only 5° or 10°. With 2 tuna, Euthynnus affinis, as predators, the nehu stayed very close to the surface and often skipped along it. They did not swim to the bottom. Also, they swam about 3 times faster than usual and dodged when the tuna pursued them. Squeezing the nehu disoriented their swimming. Some would dive to the bottom in a corkscrew manner. The nehu that appeared moribund usually were the last to be eaten.

Effect of Spray

When nehu were chummed with water sprays on, E. affinis pursued them longer than when sprays were off. Also, the nehu appeared to escape more often. The tuna acted as predators 2 or 3 times longer when the sprays were on. The sprays rippled the surface and made it more difficult for the tuna to see the nehu.

When T. macrocephala were chummed into the tank, with predators and no sprays, they sounded rapidly and usually straight down. E. affinis spent most of their predation time chasing tilapia near the bottom. With nehu, the tuna spent most of their time at the surface.

The nehu had been captive for 1 month and fed brine shrimp (frozen) and minced whitebait. They seemed to prefer the brine shrimp. During the month, some nehu used in the experiments were handled 4 or 5 times. Once, about 200 nehu were taken from a holding tank, kept in a plastic container for 20-30 minutes, chummed into the experimental tank with no predators, and left overnight; only about 1 percent died. The survivors were recaptured with nets and transferred to another holding tank, where many are still alive.

Tuna Tagged off Mexico Caught in Hawaii

A skipjack tuna tagged off the coast of Mexico 2 years ago has been caught in Hawaiian waters, reports Dr. Brian J. Rothschild, Acting Area Director, BCF Honolulu.

This is the third confirmed recovery in the past 6 years, he said. Another tagged fish was reported taken off Maui last year, but details were lacking.

The skipjack had been tagged by scientists of the Inter-American Tropical Tuna Commission, headquartered at La Jolla, California. The Commission wrote Dr. Rothschild that the fish was tagged and released off Socorro Island, in the Revillagigedo group off Mexico, on June 5, 1965--2 years and 22 days before recovery. The site is about 2,500 nautical miles almost due east of Honolulu. This fish had traveled a minimum of about $3\frac{1}{2}$ nautical miles a day after tagging.

Skipjack Don't Rest on Their Oars

Skipjack tuna swim continuously and are capable of traveling long distances in a short time. Had a skipjack tuna this size taken a straight-line course from the Revillagigedos, it would have required no more than 2 or 3 months to make the trip at its regular swimming speed, says John J. Magnuson, BCF fishery biologist. Also, the prevailing currents in the area flow from east to west. A drifting object--pumice from the August 1952 explosion of Barcena Volcano in the Revillagigedos--was picked up on the northwest coast of the island of Hawaii about 9 months after the eruption. It had made the long voyage in 264 days. A large fish swimming with the current might possibly make the trip in 50 days, says Magnuson.

The other skipjack tuna tagged off Mexico and taken in the Hawaiian catch were caught in 1962. They had been tagged in 1960, 21 and 28 months before. Like this year's, they were large skipjack, about 30 inches long.

The most recent recovery was made by the aku sampan "Marlin" on June 27, about 10 miles south of Barbers Point. The fish was a male about 32 inches long and almost 28 pounds. When tagged 2 years before, it was about 17 inches long and about 4 pounds.

The Tagged Fish

To tag fish, scientists insert plastic, serially numbered tags in the fish's body. Many skipjack tuna have been tagged off Hawaii, but none has ever been recovered from the eastern Pacific, site of a large skipjack tuna fishery, or anywhere but local waters.

The movement of tagged fish from the eastern Pacific to Hawaii supports the hypothesis of Dr. Rothschild that the skipjack tuna fisheries of the eastern and central Pacific are related. He believes that skipjack caught in the eastern Pacific are spawned in the tropical central Pacific and migrate eastward in the first months of their lives. They remain near the shores of the Americas only a short while, then return to the central Pacific to spawn. Some enter the Hawaiian catch, as the recoveries of the 3 tagged fish have shown.

In addition to the tagged skipjack tuna taken in Hawaii, one was caught in April 1963, nearer the Equator, close to Christmas Island. It had been tagged off Baja California 16 months before.

Science Backs Up Sport at Hawaiian Billfish Contest

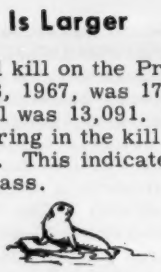
Fishery scientists from BCF's Biological Laboratory in Honolulu teamed with sport fishermen to record new information on the life histories of the elusive billfish. The occasion was the Ninth Annual Hawaiian International Billfish Tournament. Three BCF scientists were present daily, July 2-7, to measure, determine the sex, and study stomach contents of billfishes landed. They also checked the drift of 30 large, white, plastic, floating rafts dropped into the offshore water to determine surface currents in the fishing area. This will be correlated later with the strike and catch data of the billfishermen.

"Gilbert" Makes Demonstration Cruise

BCF's research vessel Charles H. Gilbert made a demonstration cruise for the press and tournament officials on July 4. Oceanographic research equipment was displayed in action. On display too were large photos of fishery science activities. On July 6, a film entitled "Fishes around a drifting raft" was shown at tournament headquarters. The film was made by BCF scientists during extended oceanic drifts up to 400 miles by the research raft "Nenue".

Fur Seal Kill Is Larger

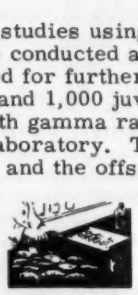
The fur seal kill on the Pribilof Islands through July 13, 1967, was 17,800. A year earlier, the kill was 13,091. Three-year-olds are appearing in the kill in larger than usual numbers. This indicates a strong incoming year class.



Study Oyster Mutation

BCF scientists of the Milford (Conn.) laboratory have developed a cooperative study with the Brookhaven National Laboratory that uses ionizing radiation to obtain marker gene and chromosome mutations in the American oyster.

Preliminary studies using irradiated eggs and sperm were conducted and the resulting larvae preserved for further examination. Also, 500 adult and 1,000 juvenile oysters were treated with gamma rays and returned to the Milford laboratory. Their survivors will be spawned and the offspring used for genetic studies.



Alaskan Juvenile Salmon Marked

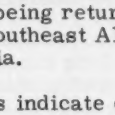
In the first large-scale marking program ever attempted in Bristol Bay, 675,000 sockeye smolt were marked with fluorescent grit. BCF Juneau, with the cooperation of the Alaska Department of Fish and Game and the Fisheries Research Institute of the University of Washington, sprayed the fish with grit as they migrated from Ugashik, Naknek, Iliamna, and Aleknagik Lakes. Three single colors and 5 two-color combinations were used to identify various stocks of smolt. The numbers of fish marked ranged from 92,000 at Ugashik Lake to 284,000 at Lake Aleknagik. During BCF's June experiments, as many as 32,000 smolt an hour were marked by a 3-man crew. The new technique will permit larger mass marking of juvenile salmon for studies of migrations and mortalities occurring in estuaries.

At Traitors Cove near Ketchikan, researchers successfully devised a technique for spraying the grit on scaleless pink and chum salmon fry. Before, it was believed that scales were needed to retain the fluorescent grit. Mortality of sprayed fry amounted to 11 percent over a 20-hour holding period.

Drift Cards Show Surface Currents in Southeast Alaska

In BCF's first use of a new device to study surface currents and juvenile salmon migrations, over 17,000 international orange, plastic, drift cards were released throughout Southeast Alaska and northern British Columbia. About 600 cards were returned in June. Pre-addressed, postage-paid cards (which the finder must cut out of each numbered drift card) are being returned from most drop areas in Southeast Alaska and northern British Columbia.

First returns indicate complex surface circulation patterns that may indicate the migration routes young salmon follow when they leave inshore waters to enter the North Pacific Ocean.



Mapping Fish Schools Is Promising

Use of aerial photography to map fish schools in the Gulf of Mexico continues to show promise as a research tool. NASA provided technical assistance in July for fish school photo analysis in the Manned Spacecraft Center in Houston. Personnel from the BCF's Exploratory Fishing and Gear Research Base in Pascagoula, Mississippi, spent the week of July 10 in Houston doing test analysis of selected fish school photographs. They used NASA's lunar mapping instrumentation.

Anadromous Fish Program Is One Year Old

The Anadromous Fish Act, P.L. 89-304, has completed its first year. The program is administered jointly by BCF and the Bureau of Sport Fisheries and Wildlife. Fifty-seven projects were submitted during fiscal 1967 by 24 of the 31 eligible States. The total Federal share was $1,478,000. Forty-six

contracts were awarded to 23 States with a total Federal cost of $1,038,000. About $900,000 was allocated to the 6 States--Alaska, Washington, Oregon, California, Maryland, and Virginia--having important commercial anadromous fisheries.

Fifteen contract renewals for fiscal 1968, with a Federal cost of $429,000, have been received. Five new Project Proposals are on hand which, when approved, will obligate $210,975 of FY 1968 funds.

First Subsidized Fishing Vessel Built on Pacific Coast

The "Mark I," first Pacific Coast commercial fishing vessel to be built under the U. S. Department of the Interior's subsidy program, was christened on June 10 at the Western Boat Building Corporation in Tacoma, Washington.

The Mark I is 99 feet long, her beam 26 feet and depth 16 feet. Her main engine is a 765-horsepower diesel. She also has two 125-horsepower auxiliary diesels for pumping and other power needs.

The Mark I. (Photo: F. B. Sanford)

She has complete electronic equipment--radar, fish finder, depth finder--everything she needs for efficient operation.

Although the Mark I is primarily a trawler, she is an all-purpose high-seas fishing vessel. Her modern design and relatively large size fit her for work in waters not usually fished by the existing fishing fleet. "All-purpose" means that she can fish for king crab and halibut, as well as drag for shrimp and bottom fish. She can also fish for herring, hake, albacore, and other species.

The Mark I's Mission

The Mark I will be a commercial fishing vessel working inside the 12-mile limit in U. S. waters. Although based at Seattle, she probably will fish primarily in Alaskan waters along the Aleutian chain.

Donald R. Johnson, BCF Regional Director in Seattle, said: "With an experienced and able skipper in Einar Pedersen and an effective vessel, we see a new era ahead of us in which U. S. vessels will be able to operate efficiently when the seas are rough and will be able to bring to the market place high-quality nutritious food from the sea for the benefit of our people, in perpetuity."

Subsidizing Vessels

In a fishing venture, financing can be crucial. Costing about $500,000, the Mark I represents a large investment. She was financed largely through Government funds. The Government provided 42.3 percent of the original contract cost of the vessel in the form of a subsidy. The balance of the construction cost was provided by the owner and additional BCF assistance.

So far, 22 contracts for new vessels have been executed under the subsidy program at a total value of about $12,500,000. Of this sum, about $8,000,000 was awarded to New England, $4,250,000 to California, and about $218,000 to the Pacific Northwest--for the Mark I.

Why is the Government giving the fishing industry this aid? Johnson points out that a law passed in 1792--and still in effect--requires U. S. fishermen to construct their

vessels in U. S. shipyards. "The subsidy program," he said, "is designed to afford our fishermen with a more equitable vessel cost in comparison with the cost of vessels constructed in foreign yards. Thus, the grant is to correct inequities."

--F. B. Sanford

BCF Will Direct 2 Films for Gulf States

The States of Alabama, Florida, Louisiana, Mississippi and Texas, comprising the Gulf States Fisheries Commission, have asked BCF to direct the production of two motion pictures on estuarine conservation. Both will be in sound and color: one a 28-minute documentary and the other a 14-minute theatrical version. Original musical scores will be composed to enhance both films. While releases will be available in 16mm., original photography will be 35mm. The films are expected to be finished next year.

The films will stress the importance of estuarine conservation, not only to the commercial fisheries, but also from other viewpoints, including industrial development and outdoor recreation.

The States have selected Charlie/Papa Production, Inc. of Washington, D. C., to produce the films under the direction of Elliot A. Macklow, Chief, Audio-Visual Services, BCF.

Report on Loans

From the program's beginning in 1956, through June 30, 1967, 1,975 applications for $51,650,004 were received by BCF, the administering agency for the Federal Fisheries Loan Fund. By that date, 1,041 applications ($24,152,641) had been approved, 622 ($14,421,977) had been declined or found ineligible, 298 ($9,924,348) had been withdrawn by the applicants before being processed, and 14 ($1,040,776) were pending. Of those approved, 375 were for amounts less than applied for--the total reduction was $2,110,262.

Under the Fishing Vessel Mortgage Insurance Program (also BCF administered) during second-quarter 1967, 9 applications for $2,483,501 were received. Since the program began on July 5, 1960, 167 applications were received for $20,302,018. Of these, 133 were approved for $15,052,071, and 12 for $3,158,501 were pending on June 30, 1967.

The first applications for a Fishing Vessel Construction Differential Subsidy under BCF's expanded program were received in December 1964. Through June 30, 1967, 80 applications for an estimated $19,058,500 in subsidies had been received. Of these, 55 applications for about $13,386,500 were approved after public hearings; 22 subsidy contracts for $12,495,288.70 were executed.

Dr. Smoker Named Director of Auke Bay (Alaska) Lab

Dr. William A. Smoker has been named director of BCF's biological laboratory at Auke Bay, Alaska. The laboratory is concerned primarily with studies of fishes important to the Alaskan economy. Dr. Smoker succeeds Dr. George Y. Harry, who takes over leadership of BCF's laboratory at Ann Arbor, Mich.

Dr. Smoker conducted fisheries research for the Washington State Fisheries Department and the Alaska Department of Fish and Game. He became chief of the research division before joining BCF in 1961.

Dr. Smoker received his BS degree in biology from the University of California in 1948 and, in 1955, his Ph.D. in fisheries from the University of Washington.

FEDERAL ACTIONS

Interior and Army Sign Agreement to Safeguard Resources

Secretary of the Interior Stewart L. Udall and Secretary of the Army Stanley R. Resor have signed an agreement to cooperate in combating pollution and in conserving natural resources and other sources of recreational value in dredging, filling, or excavation in U. S. navigable waters.

The principal areas involved are inland waters and the 8 million acres of prime estuaries, where salt and fresh water meet and wildlife and marine life thrive.

Field representatives of Interior and the U. S. Army Corps of Engineers will seek to agree before the Corps decides whether to grant permits affecting any navigable areas. Concerned Federal and state agencies and other interested parties will be informed when dredging and similar applications are filed with the Corps.

The "Memorandum of Understanding" between Interior and Army provides for final Secretary-level discussions if problems cannot be resolved by their representatives. Secretaries Udall and Resor said they agreed that "there shall be full coordination and cooperation" between their Departments and that "maximum efforts. . .including the resolution of differing views, must be undertaken at the earliest practicable time and at the field organizational unit most directly concerned."

District Engineers, empowered to grant dredging and similar permits, will coordinate their programs with Interior's fish and wildlife, recreation, and anti-pollution responsibilities.

"The Secretary of the Army will seek the advice and counsel of the Secretary of the Interior on difficult cases," the agreement stipulates. "If the Secretary of the Interior advises that proposed operations will unreasonably impair natural resources or the related environment, including the fish and wildlife and recreational values. . .or will reduce the quality of such waters in violation of applicable water quality standards, the Secretary of the Army, in acting on the request for a permit (to dredge, fill, excavate, or perform other related work), will carefully evaluate the advantages and benefits of the operation in relation to the resultant loss or damage, including all data presented by the Secretary of the Interior, and will either deny the permit or include such conditions in the permit as he determines to be in the public interest, including provisions that will assure compliance with water quality standards . . . ."

Procedures To Be Followed

Under the agreement, these procedures will be followed:

1. Upon receiving an application for dredging, filling, excavating, or performing other work, a District Engineer will notify Interior's regional directors for the Federal Water Pollution Control Administration, the Fish and Wildlife Service, and National Park Service, and state conservation, resources, and water pollution agencies.

2. Interior's regional directors will immediately make necessary studies, consult with state agencies, and advise the Army's District Engineer whether the proposed work will reduce the quality of waters in violation of specific standards, "or unreasonably impair natural resources or the related environment."

3. The District Engineer will hold public hearings on permit applications when response to a public notice indicates hearings are desirable. All interested parties will be given full opportunity to be heard on objections raised.

4. In deciding whether a permit should be issued, the District Engineer "shall weigh all relevant factors." Should Interior's directors find that water quality standards will be affected adversely, or that natural resources and the related environment will be impaired the Army Engineer will encourage the applicant for a permit to resolve the objections. If this effort fails, the case is to be forwarded to the Chief of Engineers and Interior's Under Secretary in Washington. If any issues still remain unresolved, they will referred to the Army Secretary for a decision in consultation with the Interior Secretary.

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INTERNATIONAL

International Whaling Commission Sets Quota Below Sustainable Yield

At its 19th meeting in London, June 26 to 30, the International Whaling Commission set the Antarctic Whaling quota below the sustainable yield by the 1967/68 season in recommending 3,200 blue whale units. This is the first time that the quota has been consistent with the recommendations of scientists.

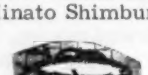
The Commission also agreed to ban completely the killing of blue whales in the Southern Hemisphere.

The Commissioners made progress in dealing with regulation of North Pacific whaling; they had been deadlocked in February 1967's special meeting. Dr. D. G. Chapman of the U. S. was chairman of the Scientific Committee; Dr. J. L. McHugh, Deputy Director of BCF, was chairman of the Technical Committee and chairman of the Special Committee of North Pacific Commissioners.

Intergovernmental Asian Tuna Conference Proposed

At the Asian tuna industry conference in Tokyo, May 30-31, Formosa proposed an intergovernmental conference with Japan, South Korea, and Taiwan (Formosa). Her delegation said that industry members alone would be unable to achieve effective international cooperation in the tuna fishery.

The Japanese Fisheries Agency reportedly views the proposal favorably but feels that industry meetings should continue for 2 or 3 more years before talks at government level are held. ("Minato Shimbun," June 13, 1967.)



World Fish Meal Production Is Steady

World fish meal production in January-April 1967 was about the same as the 1966 period. Higher production in Norway and South Africa offset lower output in Chile.

Most principal countries producing fish meal submit data monthly to the International Association of Fish Meal Manufacturers.

Country	April		Jan.-Apr.	
	1967	1966	1967	1966
	(Metric Tons)			
Canada	4,951	2,669	22,805	21,587
Denmark	8,691	4,491	22,608	24,347
France	1,100	1,100	4,400	4,400
German Fed. Repub.	6,708	5,586	24,429	25,586
Netherlands	1/	459	1/	1,510
Spain	1/	1/	1/	1/
Sweden	600	336	1,946	1,104
United Kingdom	7,099	7,858	27,667	34,295
United States	7,266	10,000	20,230	19,782
Angola	1/	2,304	2/7,606	15,788
Iceland	5,380	13,526	27,893	37,732
Norway	59,101	33,209	155,623	123,384
Peru	226,047	173,313	786,689	789,332
So. Afr. (including S.-W. Afr.)	43,850	35,557	130,646	89,833
Belgium	375	375	1,500	1,500
Chile	1,925	14,003	47,045	88,065
Morocco	1/	1/	1/	1/
Total	373,093	304,786	1,281,087	1,278,245

1/Data not available.
2/Data available only for January-February 1967.
Note: At present, Japan does not report production monthly. In 1965, Japanese production was 356,000 metric tons, according to the Food and Agriculture Organization "Yearbook of Fishery Statistics, 1965," vol. 21.

UNDP/FAO Caribbean Fishery Project Report, June 1967

During March-May 1967, vessels of the UN Development Project/FAO in the Caribbean carried out 5 cruises using the live-bait fishing method to capture pelagic (open sea) school fish. The "Calamar" conducted 2 in the Lesser Antilles south of Martinique, and the "Alcyon" 3 in the Greater Antilles and Gulf of Honduras.

The primary aim was to develop techniques for locating and capturing live bait for use in pelagic school fishing. Secondary emphasis

Fig. 1 - The Calamar.

was on geographic coverage and sampling of fish schools.

The crews were successful in capturing small fish for live bait. The best method was a lift net fished at night with a light to attract fish. A lampara net also used was less successful than the lift net.

Where Bait Was Caught

The Alcyon fished for bait at 6 localities with the lampara net and 11 with the lift net. The lampara net's best catches were in East Kingston Harbour. The most productive lift-net catches were in Port Royal and Lime Cay, Jamaica; off Puerto Quijano, Guaniquilla, and in Mayaguez Bay, Puerto Rico. The Calamar fished 14 localities with a lift net. The largest catches were made in Chaguaramas Bay, Trinidad--mostly anchovy (Engraulis and Anchoa sp.). Good catches consisting of scad (Decapterus punctatus), thread herring (Opisthonema oglinum), and sardine (Harengula sp.) were made in Admiralty Bay, Bequia Island.

There was limited success in sampling schools sighted. Schools of skipjack, yellowfin, and blackfin tuna were observed and fished west of St. Vincent, the Grenadines, and Grenada. Good signs of fish also were observed and sampled in Mona Passage area between Puerto Rico and Hispaniola. In the Gulf of Honduras, during May, detailed coverage was made cooperatively by the BCF's "Undaunted." But fresh winds reduced visibility, and little fishing was done.

Fig. 2 - Yellowfin tuna being gaffed aboard M/V Calamar.

Skipjack Taken

Both vessels caught skipjack tuna: The Alcyon caught 64 in the Mona Passage area during March and April. She took a few skipjack tuna and 18 dolphin during May between Jamaica and the Honduran coast. Near Windward Islands, the Calamar took 81 skipjack during March and April south and southwest of Grenada.

Dolphin schools associated with floating debris also were fished during March. Thirty dolphin were caught southwest of Grenada and 46 south of Barbados. Troll fishing was conducted during all 5 cruises.

During May, the Calamar conducted tuna long-line explorations in the Atlantic southeast of Barbados and off the Guianas. Thirteen longline sets were made and the number of 6-hook baskets set each day ranged from 75 to 100. During this cruise, 1,144 baskets and 6,864 hooks were set. Catches totaled 75 tuna and 19 spearfish--a catch rate of 1.3 fish per 100 hooks. Saury (Cololabis saira) and thread herring (Opisthonema oglinum) were bait.

Fig. 3 - Trainees on M/V Calamar weigh a bigeye tuna after longlining operation.

Fig. 4 - Hauling tuna longline gear aboard M/V Calamar. A crewman (2nd from right) watches coiling of mainline through mechanical hauler. Other trainees arrange a "basket" of longline gear.

In cooperation with other agencies, oceanographic data were collected and some fish tagged. Drift bottles were released from the Calamar during Cruise 67-5 to provide information on current movements. (Project Headquarters, Barbados, W. I., June 19, 1967.)

Japan and Indonesia to Start Pearl and Shrimp Ventures

Japan and Indonesia will launch two joint ventures, one for pearl raising and the other for shrimp fishing.

Preliminary contracts have been signed between Japanese firms and Indonesian counterparts. The work will be started pending approval by Indonesian authorities.

These will be the first joint ventures for private Japanese enterprises under Indonesia's legislation to introduce foreign capital. The latter's production share system has been changed to a system of foreign capital initiation and joint ventures for the economic development of Indonesia.

Raising Pearls

The pearl-raising venture will be launched by the Arafura Pearl Co. of Wakayama Prefecture and its Indonesian counterpart, Coracora.

The Japanese and Indonesian firms will haul white-lip oysters from the islands around Aru, Kei, and Kepulanan north of Arafura Sea and cultivate them at Aru and other islands. The first cultivation site will be Dobo near Aru.

The Japanese firm will send US$1 million worth of vessels and machinery necessary for the cultivation and 20 engineers. The cultivated pearls will be sold by the Japanese. Profits will be shared equally with the Indonesian firm.

The trial operation period will be two years, and the contract will be effective for the next 20 years.

Rich Shrimp Resources Reported

The shrimp fishery will be undertaken by the Toyo Menka Kaisha, which has asked the Indonesian authorities for full-scale investigation. Concrete measures will wait on the investigation results.

The project calls for shrimp fishing in waters west of Kalimantan and the catches to be sent directly to Japan. The shrimp resources are said to be very rich in those waters.

The contract is for 11 years, to be extended for another 5 upon conclusion, with approval of both parties. ("Japan Times," June 26, 1967.)

Japan Wants Indonesia's Agreement to Protect Former's Vessels

The Japanese Agriculture-Forestry Minister urged the Government at the June 9 Cabinet meeting to negotiate an agreement with Indonesia to protect the former's fishing vessels from seizure. Since 1960, when Indonesia began enforcing her 12-mile sea law adopted in 1957, 17 Japanese fishing vessels (including one freighter) were reported seized and fined on charges of territorial sea violations or unauthorized navigation in Indonesia's inland waters.

Japanese vessels fishing off Indonesia annually take about 6,000 metric tons of tuna worth close to US$3.3 million. ("Minato Shimbun," June 10, 1967.)

Japan to Discuss 12-Mile Zones with Spain and Mauritania

The Japanese Overseas Trawlers Association plans to send a 7-man fact-finding mission to Spain and Mauritania to discuss their extension of fishery zones. Spain adopted the 12-mile exclusive fishery zone in May, and Mauritania recently revised its 12-mile limit. These actions are said to have handicapped considerably Japan's Atlantic trawl fishery: reducing Japanese bottomfish catches off west Africa by 30 percent and octopus by over 80 percent.

Government-Level Talks May Follow

The Japanese group is scheduled to meet with Spanish and Mauritanian industry representatives to find out whether those countries would change their views about Japanese fishing inside the reserved zones. Another purpose is to pave the way for government-level negotiations comtemplated by Japan.

The group consists of key members of the Japanese distant-water trawl fishery and one Fisheries Agency official. It was scheduled to depart Japan July 7 on a 20-day trip to Madrid and Vigo, Spain, and Nouakchott, Mauritania. ("Minato Shimbun," June 21 and 23, 1967.)

Japan to Study Pacific Fisheries Convention

The feasibility of forming a "Pacific Fisheries Convention" between the coastal nations of the Pacific region is to be studied by the Japanese Ministry of Foreign Affairs. The purpose is to try to cope with the international trend toward unilateral extension of territorial and fishery limits.

The Convention, proposed by Foreign Minister Takeo Miki, provides for an agreement similar to the European Fisheries Convention. There, the contracting nations agree to adopt an exclusive 12-mile fishery zone and to settle fishery problems through multination negotiations.

The Foreign Ministry reportedly intends to conduct the study on the basis of the 12-mile sea limit proposed at the United Nations Conference on the Law of the Sea, convened in Geneva in 1960. ("Minato Shimbun," June 20, 1967.)

FOREIGN

LATIN AMERICA

Peru

FISH MEAL INDUSTRY IN CRISIS

Peru's fish meal industry continues in crisis. Stocks rose to record levels, while exports from January 1 to May 15, 1967, were below those for the same months of the past 3 years. World prices declined from the 1965/66 season but appear to have recovered somewhat and become firmer.

The Peruvian Government, after studying the industry's problems, apparently has decided not to give the industry immediate tax and customs duties relief. Instead, it is considering using such collections to establish a fund to help finance modernization and improvement of plants and fleets. On June 6, 1967, widespread increases were made in import duties. Newspapers report industry concern that these increases will aggravate the situation. The current fishing season ended on June 15. The size of the 1966/67 anchovy catch likely reached about 8.5 million metric tons. This catch is estimated to have produced about 1.5 million tons of fish meal. Stocks at the end of the fishing season are expected to be over 750,000 tons. The industry says a high percentage already has been sold.

Panama

REPORT ON FISHING INDUSTRY

Panama's shrimping operations are the major part of its commercial fishing. Preliminary figures on 1966 shrimp exports indicate about 10 million pounds, all to the U.S. and slightly lower than 1965. But International Monetary Fund data show that 1966 shipments were about $1 million above 1965. The higher percentage of premium grade shrimp and price rises were responsible for the overall increase.

The fishmeal and fishoil industry continues to grow but at a slower pace than expected. Two reduction plants are now operating; firms desiring to establish plants have to submit their plans to the Ministry of Agriculture, Commerce and Industries for approval. Official sources say this requirement was made to protect the developing industry and the marine sources used by it. The quality of the fishmeal and fishoil produced is considered very good, but declining world prices have affected investment returns.

Panama hopes that the UN fisheries study will be inaugurated in the area this year. Both Government and industry sources are optimistic that major advances will be made possible by the study's recommendations. Part of the study's cost is to be paid by Panama. To help meet this expense, the Government has introduced a "sailing permit" requirement for fishing vessels of 10 tons or over which leave from Panamanian ports; a tax stamp of $20 or $40, depending on type of vessel, must be attached to sailing permit applications.

In its 1966-67 session, the Panamanian National Assembly passed legislation extending territorial waters to 200 miles. It has not ratified the 1958 "Convention on Fishing and Conservation of the Living Resources of the High Seas."

Shrimp Production

The Bureau of Fisheries, Ministry of Agriculture, Commerce and Industries, reports that 1966 shrimp catch totaled 12,440,440 pounds, about 3.6% less than 1965 and 20% less than 1964, the record year. Government and industry describe the 1966 figure as "satisfactory." Both expect the average of 12-13 million pounds of the past few years to continue and even improve. Unofficial figures on shrimp exports from the largest local shipping lines indicate shrimp exports amounted to about 10 million pounds, including an estimated 75,000 pounds of lobster tails.

Premium grade "whites" taken in 1966 were nearly five percent above 1965; the catch of valuable "pinks" decreased about 12 percent. This latter figure was partially offset by the higher catch of "Titi," the only other important category. Because prices were good in U. S. markets, the value of 1966 shrimp exports exceeded 1965 by almost $1 million or 14 percent ($7.66 million and

$8.6 million, respectively). Marketing within the country is handled by individual fishermen; sales promotion does not exist.

The bulk of Panama's shrimp catch is transported by sea, mostly to New York; shipments to the U. S. West Coast have increased in recent months. Further increases are predicted, also that shipments to the U. S. East Coast will continue steady. Some production in the Chiriqui region is shipped by air to Miami.

General Conditions

The possibility that shrimp conservation measures may have to be taken is discussed occasionally, but industry representatives appear to believe they are not necessary. Many contend that the indirect control Government exercises by limiting number of shrimp boats--232--is adequate control. Of the 232, some are in such poor condition as to be inoperative. Others are used occasionally due to age and/or need for extensive overhauling. But, as the older, less efficient boats go out of operation, they are being replaced by larger and better-equipped vessels. This means that the average catch per boat will increase noticeably before long, and the question of conservation measures will need careful consideration.

Fishing conditions throughout 1966 were generally good, although January-February and October-December reflected traditional "slack" periods. Early 1967 was somewhat slower than usual, but industry representatives expected improvement to continue until late 1967.

Chile

WHALING DEVELOPMENTS

In 1965, Chile killed 385 blue and 6 humpback whales; in 1966, 128 blue and 7 humpback whales. The 1965 kill shows that regulation and conservation are not completely effective. Although 2 Chilean fishing concerns are Government authorized to whale, the bulk of the catch (particularly blue and humpback) has been made by one firm. During the past 2 seasons, this firm agreed to let a Japanese company operate 5 whale catcher boats and sell the catch for processing at its plant in Quintay and subsequent export of whale products to Japan.

Agreement Will Lapse

Officials of the Chilean firm say this agreement will not be renewed and that their firm has decided to cease whaling activities for the next few years. They cited two reasons: scarcity of whales and the low profit. The officials were aware that this time would be required to build up the whale population.

The catch of blue and humpback whales off Chile's coast will be minimal during the next few years. No important company seems interested in large-scale operations. Chilean initiatives with the Secretary General of the South Pacific Commission to tighten regulations on killing whales is a step in the right direction. (U. S. Embassy, Santiago, May 31, 1967.)

* * *

ANCHOVY LANDINGS IN FIRST-THIRD 1967 WERE HALF 1966 PERIOD

Landings of anchovy in northern Chile from January through April 1967 were 258,719 tons; in the 1966 period--510,785 tons; 1965--231,158 tons.

Fish meal produced from anchovy in northern Chile for January-April was: 1967--45,681 tons; 1966--88,220 tons; 1965--38,072 tons.

Fish oil production in northern Chile was:

Year	January-April
	Metric Tons
1967	3,898
1966	7,232
1965	5,036

Fish Meal Exports to U. S.

Exports of fish meal (produced from fish and shellfish, excluding whales) in 1966 were 184,697 tons worth US$25,433,829. Exports of fish oil (excluding whale oil) were 16,401 tons worth US$2,605,449. Fish meal was exported mainly to the U. S., Netherlands, West Germany, and Belgium. ("Instituto de Fomento Pesquero," May 29, 1967.)

Cuba

INCREASES HER FISHING FLEET

Cuba was scheduled to receive two medium trawlers from the Soviet Union by the end of July 1967. The vessels most likely will be of the "Maiak" class (SRTM), equipped with freezing capacity for fishing in the tropics as well as northern latitudes.

In June 1967, the first steel-hull fishing vessel, the "Cocal," was launched in Cardena's Shipyard for Cuba's state-owned fishing fleet. Displacing 112 tons, the vessel has a range of about 13,000 miles and will have a crew of 16. The Cocal is probably the prototype of a new series of vessels that will be built by the Cardenas Shipyard, which until now only constructed wooden vessels.

* * *

BANS PRIVATE FRESH-WATER COMMERCIAL FISHING

On May 24, the Director of the Cuban National Fishing Institute banned all private commercial fishing in Cuban lakes and rivers. The Institute will control these areas.

Guatemala

REPORT ON FISHING INDUSTRY

In 1966, Guatemala's fisheries contributed less than 1 percent of the gross national product of US$1.4 billion. Marine research is not being conducted.

There are two ports of some importance on the Atlantic Coast--Puerto Barrios and Matias de Galvez; the latter, run by the Government, is being enlarged to double its freight-handling capacity (by 1970).

The two Pacific ports are now merely open roadstands, although they do have small shrimp-freezing plants. The Government has approached international lending agencies to finance a US$15 million Pacific port to stimulate the fishing industry.

Shrimp Fishery

Commercial exploitation of the Pacific coast shrimp fisheries began in 1960. The fleet has totaled around 30 vessels in recent years and flies the Guatemalan flag. Almost all the vessels were built in Florida and are less than four years old. The construction of these wooden vessels is standardized to facilitate repairs and replacement of parts. The vessels range from 62 to 72 feet.

The Directorate General of Natural Resources reports that finfish landed in 1965 totaled more than 242,000 metric tons; in 1963, landings were 130,000 metric tons.

Shrimp catches in 1965 of 897 metric tons declined from recent years. Although no data are available, catches of shrimp apparently improved in 1966. The two major shrimp enterprises are comprised of 49 percent Japanese capital, and 51 percent Guatemalan; a third smaller company is Guatmalan owned. These companies operate off the Pacific coast. (U. S. Embassy, Guatemala, May 13, 1967.)

Brazil

PROTESTS PRESENCE OF SOVIET FISHING FLEET

Brazilian Admiral S. da Gama, President of the Brazilian Navy Club and of the Marine Studies Foundation, told the press recently that the Government cannot tolerate Soviet fishing in "Brazilian territorial waters." Apparently, he was referring to the statement of a Brazilian fishing boat captain who reported 30 Soviet fishing fleets near the shores of Rio Grande do Sul Province.

In Porto Allegre, there has been sharp local reaction to Soviet fishing off Rio Grande do Sul. Editorials in the local press call "for more fish in Brazilian nets and less Russians in Brazilian waters." They also chastise the national Government for its failure to "keep the Russians out of Brazilian waters" and to build the domestic fishing industry. Secretary of Agriculture Machado, of Rio Grande do Sul Province, even issued a call for extending Brazilian waters from 12 to 200 miles. (U. S. Consulate, Porto Allegre, July 6, 1967.)

EUROPE

USSR

FIRST-QUARTER 1967 CATCH IS 5% ABOVE 1966

During the first 3 months of 1967, Soviet fishery landings were 2,345,000 metric tons, about 5 percent higher than landings in the 1966 period and about 5 percent above the quarterly plan. The 1967 catch plan is 6,300,000 tons. Catch increase apparently was due to the use of more vessels and fishermen.

However, labor productivity in the fishing industry increased by only 2 percent over 1966.

* * *

IMPROVES FRESH-WATER SUPPLIES FOR FISHING FLEET

In 1966, according to Vladivostok newspapers, the Soviets had great difficulty supplying their fishing fleets off Alaska and the Pacific Northwest with fresh water. Many fishermen complained that even when water was supplied it was unclean. Four tanker vessels (called fuel and water carriers by the Soviets) were assigned in 1966 to supply the fleets off the U. S. and Canada.

In 1967, the Soviets expect a change for the better since the Canadians consented to allow a Soviet water carrier to come into Vancouver regularly for fresh water. About 50,000 metric tons of water will be bought in Canada this year. The Main Administration of Far Eastern Fisheries has permanently assigned the water carrier "Evensk" to this job; she will not carry any fuel.

In late 1966, the Soviets already had begun to ferry water from Vancouver. The "Erebus" averages 2 trips a month. It takes 10-12 days to deliver the fresh water to fishing vessels and 2-3 days to resupply in port. She has a capacity of 3,000 metric tons.

* * *

PACIFIC OCEAN PERCH CATCH DROPS IN GULF OF ALASKA

Average Soviet catches of Pacific ocean perch in the Gulf of Alaska have decreased tremendously during the past year. In 1966, the average haul was 6 to 10 metric tons. In April and May 1967, average catches did not exceed 2 tons per haul; they were often as low as 1 ton per haul. In early May 1967, 5 exploratory research vessels led by the "Kanopus" began to study reasons for the catch decline.

* * *

HOLDS SEMINAR ON RADIATION PRESERVATION

Radiation preservation of fishery products was the principal subject of the Kaliningrad Seminar of the Soviet Isotope Association. Scientists of the USSR Ministries of Fisheries and Atomic Energy and specialists from other Soviet Ministries also participated. The main purpose of the seminar was to survey recent advances in research on radioactivity and propose steps for introducing these advances into the fish-processing industries.

* * *

FORMS COMMITTEE ON ZOOLOGICAL NOMENCLATURE

Under the sponsorship of the Soviet Academy of Sciences (Section for General Biology), a Committee on Zoological Nomenclature was formed within the National Committee of Soviet Biologists. Both the chairman and the vice-chairman of the new committee are ichthyologists: A. N. Svetovidov, who is responsible for the nomenclature of living fish; and D. V. Obruchev, for the nomenclature of fossil fish. Among other members, I. M. Gromov will supervise the nomenclature of marine mammals, and Ia. I. Starobogatov molluscs and crustaceans. Correspondence with the committee reportedly is welcome. ("Voprosy Ikhtiologii," Vol. 43, No. 2.)

Denmark

1966 EXPORTS WERE BELOW 1965's RECORD

Danish exports of fishery products during 1966--364,840 metric tons worth 886 million kroner were slightly below 1965's record level. Landings by Danish vessels in other

Denmark (Contd.):

countries totaled 10,416 metric tons, nearly three times 1965's direct landings. Principal markets were West Germany, the United Kingdom, and Sweden. Sales to the U.S. rose 25 percent, to nearly 75 million kroner.

The quantity of cod fillets and blocks exported increased to 30,855 metric tons worth 119.6 million kroner, up 11 percent in quantity and 14 percent in value. Exports of salted, dried, and smoked fish declined. Exports of pond trout decreased slightly in quantity but value increased by 11 percent. Fish meal exports showed little change, but fish oil exports declined sharply.

Direct landings in foreign ports increased greatly. The United Kingdom took by far the major share of Danish direct landings. Those in Norwegian ports nearly ceased in 1966.

Exports to EEC, EFTA, East Bloc

The Common Market (EEC) was the leading market for Danish fishery products. It took 348 million kroner, a slight decline from 1965. Denmark's EFTS (European Free Trade Association) partners bought products worth 323 million, almost unchanged from 1965.

Exports to East Bloc countries increased by about 50 percent, but they were still small relative to exports to EEC and EFTA. West Germany remained the principal market, buying products worth 238 million kroner. These included large quantities of herring, cod, plaice, pond trout, and many others. The United Kingdom and Sweden were other major markets. Although East Germany is not a leading buyer, sales to her increased by 68 percent over 1965. This was due partly to a substantial contract signed by 2 large Danish fish exporters.

* * *

1967 EXPORTS OF GROUNDFISH FILLETS AND TROUT DECLINE

Danish exports of fresh and frozen fillets and blocks of cod and haddock in the first 4 months of 1967 were down sharply from the 1966 period. In January-April 1967, total exports of these items were about 10 million pounds, of which 2.3 million pounds went to the U. S. That was a drop of 49 percent in total shipments and 54 percent in exports to the U. S.

In January-April 1967, exports of rainbow trout of 6.9 million pounds were down slightly from the 7 million pounds in the 1966 period. However, rainbow trout exports to the U. S. rose 61 percent to 348,559 pounds.

Norway

LIMITS PRODUCTION OF FROZEN FILLETS

Norwegian frozen fillet production totaled about 19,000 metric tons in January-April 1967, down 15 percent from the 1966 period. But stocks were building up and storage facilities were overloaded because of slow sales. So Norwegian freezing plants decided to cut output of frozen groundfish fillets in May-September 1967 to 30 percent of the quantity frozen in the 1966 period. ("News of Norway," May 22, 1967.)

France

FISHING LIMITS EXTENDED TO 12 MILES

France announced fishing limits of 12 miles in a decree published June 9. The extension accorded with the principles of the Western European Fisheries Convention approved March 9, 1964, by France and 12 other countries. The convention proposed a "6-plus-6" plan: an inner 6-mile zone reserved to the coastal state for fishing after a phasing-out period for foreign fishing, and an outer 6-mile area where traditional fishing rights of foreign fishermen might be recognized. (U. S. Embassy, Paris, June 12, 1967, and other sources.)

Spain

EXTENDS FISHING LIMITS TO 12 MILES

Spain extended its fisheries jurisdiction to 12 miles, measured generally from the low-water mark along the coastline, by law number 20/1967, April 8, 1967. However, provision also was made to draw straight base lines between certain nautical points less than 24 miles apart.

Spain (Contd.):

The extension was in accord with the principles of the Western European Fisheries Convention approved March 9, 1964, by representatives of Spain and 12 other countries (see France on p. 46).

Under the law, traditional foreign fishing in the 6-12 mile zone may be continued at a level not exceeding the habitual catch, provided reciprocal rights are granted Spanish fishermen by the foreign countries involved. (U. S. Consul, Bilbao, June 14, 1967, and other sources.)

* * *

ADDED 32 VESSELS IN 1966

Expansion of the Spanish distant-water fishing fleet continued in 1966 with the addition of 32 vessels over 250 gross tons. The long-range freezer fleet operated mainly off South Africa and increased its landings by 46 percent to 195,000 metric tons. This gain was offset, however, by lower landings in the coastal fishery. Total landings in 1966 of 1.1 million tons were about the same as in 1965.

In recent years, fleet development has been stimulated by a Government loan program. Its aim is to create a modern fleet by 1970 capable of catching 1.5 million metric tons a year. (U. S. Consul, Bilbao, June 14, 1967.)

Greece

REPORT ON FISHING INDUSTRY

The processed fishery products of Greece include canned fish, salted fish, sea sponges, and fishmeals. Only one small factory, in Thessaloniki, cans fish. The decrease in production of canned fish seems attributable to increased foreign competition in the Greek market.

Fish salting is done in many small, unmechanized establishments in coastal localities, chiefly in Cavala, Thessaloniki, Volos, and on the islands of Euboea and Mitylene. The Directorate of Fishing, Ministry of Industry, estimated 1966 production at 4,000 tons, compared with 4,500-5,000 tons in 1965. The decrease may have resulted from a dietary trend toward more nutritional foods.

Sea Sponges: These are Greece's principal processed fishery export product. In 1966, sponge production, conducted in Greek and Libyan waters, amounted to 54 tons (compared with 69 tons in 1965). Decreased production was due chiefly to difficulty in enrolling crews and in obtaining permits from North African countries.

Fishmeals: Initiated in late 1965, production rose in 1966 to 714 tons. This was produced on board 3 fish-factory vessels (one operated only the last two months of 1966). There are no shore-based fishmeal factories. Production is expected to increase as more fish-factory vessels now on order are commissioned this year and in 1968.

Construction of Fish Markets

The buildings of the fish markets have been completed in Piraeus, Thessaloniki, Patras, Chalkis, and Cavala. Work on the fish market at Volos was delayed. A public tender was held in 1966 among East European bilateral trading countries to supply equipment for the markets against the export of Greek agricultural products. A Soviet organization was high bidder but no award has been made. The management of the fish markets reportedly will be undertaken by the Agricultural Bank of Greece. The bank has been financing small and medium-size owners of fishing and sponge-fishing vessels.

Governmental Activities

A corporation has been established by the Hellenic Industrial Development Bank (ETVA) to organize production and marketing of the deep-sea fleet's catch. The catch increased from 1,360 tons in 1956 to 29,500 tons in 1966; it is expected to reach 86,000 tons by 1970. Eventually, this corporation will set up facilities to process fish and fish byproducts. Its capital is 20,000,000 drachmas ($667,000); 49% of the share capital is open to subscription by owners of deepsea vessels.

Foreign Trade

Exports of fishery products, except sponges, totaled 1,954 tons ($1,326,200) in 1966, compared with 3,483 tons ($1,602,400) in 1965. The difference was due chiefly to decreased exports of fresh, frozen, salted, and canned

Greece (Contd.):

fish. Exports to Bulgaria recorded the largest decrease (36 tons, $8,300 in 1966; 1,447 tons, $305,900 in 1965). Sponge exports amounted to 102 tons ($2,591,100) in 1966 (of which 98 tons were bleached or otherwise processed), compared with 106 tons ($2,496,900) in 1965. In 1966, the U. S. was the principal buyer (30 tons, $876,000).

Imports

Greece imported 40,620 tons of fishery products worth $13.2 million in 1966; in 1965, 55,084 tons valued at $16.9 million. Imports in 1966 included: fresh, frozen, and salted fish, 15,374 tons ($6.3 million); canned fish 7,175 tons ($3.3 million); sea sponge 17 tons ($219,000); and fish and meat meals 18,054 tons ($3.3 million). Import of frozen fish into Greece was prohibited in March 1966.

Imports from the U. S. included: canned fish 3,129 tons ($826,200), of which 3,072 tons ($784,700) were canned squid; and fish and meat meals 247 tons ($40,733).

Romania

FISHES FOR HERRING OFF GEORGES BANK

In 1965 and 1966, Romanian vessels fished Georges Bank mainly for herring. It takes 24 days to reach the Bank from Romanian ports and to return; actual fishing extends for about 50 days. Average catches per vessel per day in 1966 were 40-50 metric tons, but up to 70 tons were caught on some days. Total production costs of one metric ton of Georges Bank herring to the fishing industry is about 7,000 lei (US$589.20); selling price is 10,000 lei ($842.70 a ton). Thus, the industry makes a "profit," but its significance is academic because it, as all other industries, is State owned. The "profit," however, does make it possible to expand and obtain new investments.

Romania plans to buy by 1970 15 large stern factory trawlers to expand her fishing on Georges Bank and off Southwest Africa. In 1966, she had only 2 alternating large stern factory trawlers (both purchased in Japan) fishing in the northwestern and Southeastern Atlantic. Each had on board a fishery scientist who collected data on the biology of the species and oceanographic conditions.

Yugoslavia

AIDS ARABS WITH FISHERY PRODUCTS

The Federal Executive Council (the Cabinet) of Yugoslavia disclosed on June 17 its long-range program of economic aid to Arab countries. This includes an increase in trade, better credit arrangements, new capital investments, and immediate aid in food products. Under the latter, 1,000 metric tons of canned fishery products will be shipped.

Poland

TRAWLERS STOP LANDING FISH IN EASTERN NIGERIA

Polish trawlers that were delivering fresh and frozen fish to cities in Nigeria have been ordered by the Polish Government to discontinue deliveries to Eastern Nigeria, which has proclaimed itself the independent State of Biafra. The order probably reflects a desire to respect the naval blockade of Biafra instituted recently by the Central Government in Lagos.

* * *

TWO FISHING VESSELS ENTER NEW ENGLAND PORTS

At 8:30 p.m., Sunday, June 11, 2 Polish fishing trawlers entered Gloucester harbor in Massachusetts. U. S. Coast Guard officers boarded them and advised that they were violating both the U. S. 3-mile territorial sea and 12-mile fishery limit and ordered them to leave. The Polish captains said they were out of fuel and water, and had been advised by their authorities to contact a Gloucester stevedoring company in case of need. They complied with U.S.C.G. orders but remained just outside the 12-mile zone. There, they contacted the stevedoring company in Boston. On June 13, U. S. authorities

Poland (Contd.):

finally allowed both trawlers to refuel and reprovision at Boston. On June 15, both vessels left for the Georges bank herring fishery.

All available evidence indicates that the 685-gross-ton vessels were forced to seek U. S. assistance by "force majeure." Both trawlers ("Sleza" and "Radwa") belong to the Gryf fishery cooperative. Its vessels for years have fished the Northern ICNAF area (especially the Labrador Sea) but never as far south as Georges Bank. The Gryf cooperative, however, had an extremely bad 1966/67 winter cod fishing season off Labrador--the expedition was an economic failure. Because of rough weather, medium Polish fishing vessels were unable to catch much cod or deliver the catches to processing vessels.

Vessels Needed Food and Water

Before leaving Poland, the Gryf administrators contacted the Dalmor cooperative, whose vessels fished on Georges Bank during the last few years. They were told that Polish fishing vessels normally obtain their supplies in the Canadian port of Halifax, but that in emergencies they may go to U. S. ports. The regulations governing entry of Polish vessels into U. S. ports apparently were not explained or transmitted to the captains of individual vessels.

U. S. Coast Guard boarding of the 2 vessels in Boston revealed that on the Radwa only 2 percent of normal drinking water capacity remained, and the Sleza's food supplies were "rotten and moldy." Both trawlers were low on fuel.

Bulgaria

EXPANDS FISHING FLEET AND GROUNDS

A few years ago Bulgaria contracted with the Soviet Union to buy 20 large stern trawlers by 1970. In mid-1967, at least 7 trawlers (each about 3,200 gross tons) were delivered. Initially, the Bulgarians fished in the southeastern Atlantic off southwest Africa. Soviet experts were aboard the newly delivered trawlers to train the Bulgarians in navigational and fishing techniques.

In March and April 1967, high-seas fishing operations expanded into the southwest Atlantic. Two large stern trawlers (the "Pelikan" and the "Feniks") left the Bulgarian fishing fleet, which was catching pilchards off Africa, and crossed the Atlantic towards the Patagonian Continental Shelf off Argentina.

The Soviet Union began a fishery for south western Atlantic hake off Argentina in late 1966. It is believed the Bulgarian vessels may fish with the Soviet fleets, which could provide them with fishing data and supplies (water, fuel, repairs, etc.).

ANTIBIOTIC IMPROVES PEARL HARVEST

A significant increase in the number of good cultured pearls produced in Japan results from dipping seeds into an antibiotic solution before inserting them into the oyster. Aureomycin chlortetracycline has been found the most effective antibiotic against the infections that misshape or discolor pearls.

It takes 3 to 5 years to produce a reasonably sized pearl. The huge Japanese industry produces 400 million cultured pearls annually. Use of the antibiotic has resulted in a 30 percent increase in output of top quality pearls and a significant increase in ordinary pearls. (From Sea Frontiers, copyright 1966 by The International Oceanographic Foundation, Miami, Florida.)

ASIA

Japan

FISHERY EXPORT TARGETS ARE LOWER FOR FY 1967

Japan's Supreme Export Trade Council met on June 6 to determine fiscal year 1967 (April 1967-March 1968) export targets and develop measures to attain them. The Council set the FY 1967 export target at US$10,569.3 million, 10.6 percent above FY 1966 actual exports of $9,558.9 million.

The goal for fishery products was set at $319.2 million--3.02 percent of the total export target and 88.1 percent of FY 1966's actual exports. The cut in fishery products below 1966 exports was based on the outlook that exports likely will not increase much because of growing international restrictions on fisheries and increasing consumer demand in Japan for higher-priced fishery products.

The FY 1967 export target for fishery products is:

Fishery Product	Export Target, FY 1967	Comparison with Actual Exports FY 1966
	US$1,000	Percent
Canned fish	133,160	- 0.8
Frozen fish	101,100	-10.0
Pearls	64,400	+ 0.5
Agar-agar	2,800	+ 0.4
Salted & dried fish . .	8,200	+ 0.9
Whale oil	9,573	+52.3

Source: "Suisan Keizai Shimbun," June 8, 1967.

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STUDY OF 12-MILE ZONE SLATED

The Japanese Fisheries Society's International Fisheries Committee agreed at the June 14 meeting to form a subcommittee to study Japan's fishing zone problem. The subcommittee will conduct a thorough independent study to assess the merits of establishing a 12-mile exclusive fishery zone off the coast. This is being strongly urged by Hokkaido coastal fishermen but opposed by some circles because it would have adverse effect on Japan's high-seas fisheries.

Government's Position

The Government's attitude appears to be that setting up a 12-mile fishery zone is premature. This is based on the view that extension of fishery jurisdiction would: (1) contribute nothing toward solving the controversial problems of South Korean salmon fishing and Soviet saury fishing off Japan; (2) compel Japan to recognize, to her great disadvantage, fishery jurisdictions claimed by other countries; and (3) conflict with Japan's basic position that unilaterally established fishery zones have no effect internationally. This conflict with her basic position would occur when Japan, entering bilateral agreements, would seek to maintain administrative and legal jurisdiction over her fishing vessels within foreign-claimed waters (beyond the 3-mile limit). Even if the Government should decide to establish an extended fishing zone, it will wait until the 12-mile limit becomes more accepted internationally. ("Suisan Tsushin" and "Shin Suisan Shimbun Sokuho," June 16, 1967.)

* * *

FISHERMEN URGING 12-MILE FISHING ZONE FOR HOKKAIDO

Japanese coastal fishermen in Hokkaido want to see a 12-mile exclusive fishing zone established off their island. They claim that exploratory fishing by South Koreans in recent years within or about 10 miles off Hokkaido's southern coast--and Soviet saury and squid fleet operations off the coast--threaten to disrupt orderly operations. They say these operations will lead inevitably to conflict unless Japan's fishery jurisdiction is extended beyond the present 3-mile limit.

A delegation of Hokkaido fishermen went to Tokyo to urge their Diet representative to press for passage of 12-mile exclusive fishing zone legislation in the current session. ("Hokkai Suisan," June 5, 1967; "Minato Shimbun," June 1, 1967.)

* * *

CARIBBEAN SHRIMP OPERATIONS INCREASE

On May 23, the Fisheries Agency informally approved applications of 7 firms to operate experimentally a total of 35 shrimp vessels in the Caribbean Sea and off the Guianas. The 7 firms are: Nichiro Gyogyo, Toyo Shrimp, South Pacific Fishery Cooperative

Japan (Contd.):

Association, Hakodote Kakai, Hokoku Suisan, Yutaka Gyogyo, and Shinyo Gyogyo.

At present, 15 shrimp vessels are operating in that area. Shrimping prospects are reported good off the Guianas, where presently 260-270 U. S. and Mexican vessels are said to be operating profitably. ("Suisan Keizai Shimbun," May 26, 1967.)

* * *

SHRIMP TRAWLERS ASSOCIATION FORMED FOR SOUTH AMERICA

A Japanese trawlers organization, named South America Trawlers Association, was formed in Japan on June 7. Its purposes are to ensure efficient management of shrimp operations off the coast of the Guianas in northern South America--and to help resolve international problems its vessels might encounter because many U. S. and Mexican shrimp vessels operate there. ("Minato Shimbun," June 8, 1967.)

* * *

PEARL PRODUCTION CUT 30 PERCENT

Thirty-three cooperatives of fishermen in the Japanese National Federation of Pearl Culture Cooperative Associations will reduce their combined annual production by 30 percent in an attempt to cope with a recent sharp decrease in exports of cultured pearls since the second half of 1966.

The federation said that the decline is attributed partly to business developments in the U. S. and West European countries, the principal customers, but also to the growing circulation of poorer quality pearls.

It decided therefore to ask its members to stop undesirable practices of planting pearl nuclei in pearl oysters during the summer.

The federation anticipates at least a 30 percent cut in national output by halting these practices. It also scheduled a new overseas publicity drive to promote cultured pearl exports. ("Japan Economic Journal," June 6, 1967.)

* * *

SUMMER ALBACORE LANDINGS AND PRICES RISE

Early in June, albacore vessels were scattered over a wide area east of the Izu Islands (south and east of Tokyo) and fishing continued good. Some vessels were landing over 30 tons per day. Despite the increasing catch, exvessel prices in Japan held firm in early June at around 155-160 yen per kilogram (US$391-403 per short ton); local packers were buying most of the landings.

The Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN), which plans to buy and store around 3,000 tons of albacore to help stabilize prices, made no move in early June because of the firm prices.

On June 22, Japanese pole-caught summer albacore landings at the tuna ports of Yaizu and Shimizu totaled 22,580 metric tons--7,280 tons more than the 15,300 tons landed there during the 1966 period. The fishery, however, was nearing the end of the season; many pole-and-line vessels already were shifting to skipjack fishing.

Summer albacore prices in Japan continued to advance. In late June 1967, they averaged exvessel 167-168 yen a kilogram (US$421-423 a short ton). This compared with around 155-160 yen a kilogram ($391-403 per short ton) of a week earlier. Japanese fishing and packing industries are unable to readily explain the cause of rising prices. They attribute it partly to rising fresh food prices.

So far, NIKKATSUREN had purchased, under its stabilization program, about 150 tons. They were being held in cold storage until they could be packed in oil for marketing in Japan. ("Suisancho Nippo," June 23, 1967.)

* * *

ALBACORE EXPORT PRICES RISE

Japanese frozen albacore prices for exports to the U. S., stimulated by the recent U. S. purchase of 2,000 tons at c.i.f. $470 per short ton, are reported advancing rapidly. Exporters are said to be asking around c.i.f. $480-485 per short ton for ship-frozen fish. This is about $50 more than the mid-May export price of c.i.f. $435 per ton. Even

Japan (Contd.):

summer albacore are reportedly being offered to U. S. buyers at prices up to c.i.f. $470 per ton.

Japanese circles attribute the uptrend in albacore prices to: (1) resumption of buying by U. S. packers, who believed prices in Japan would not drop any further despite predicted good summer albacore season; (2) improved U. S. canned tuna sales; (3) decline in albacore catches off American Samoa since April; and (4) uncertain outlook for California albacore fishery. ("Suisan Tsushin," June 12, 1967.)

* * *

MOST OF 1966 FROZEN TUNA EXPORTS SHIPPED TO U. S.

According to the Japan Export Frozen Tuna Producers Association, frozen tuna exports in business year 1966 (April 1966-March 1967) totaled 192,136 metric tons. By country of destination, 145,841 metric tons were exported to the U. S., 35,323 tons to Italy, 9,391 tons to other European countries, and 1,581 tons to Africa.

Shipments to the U. S. consisted of 76,709 metric tons delivered direct from Japan, 38,464 tons transshipped from the Atlantic, and 30,668 tons delivered to overseas bases.

Exports to Italy included 2,997 tons of direct shipments and 32,326 tons of Atlantic transshipments. To other European countries, 435 tons of direct shipments and 8,956 tons of transshipments. ("Suisan Keizai Shimbun," May 26, 1967.)

* * *

JAPANESE-ITALIAN TUNA FISHING VENTURE BEGINS

A joint Japanese-Italian tuna-fishing venture, involving Hoko Suisan Fishing Company, was scheduled to begin in July. The venture was agreed to originally in 1964, but its operation was postponed by the delay of the Italian partners to get the vessel built in Italy.

A 1,150-gross-ton tuna mothership is now under construction. Scheduled for completions in July, the vessel will begin fishing soon afterward. Production target is 2,000 metric tons of tuna annually. All catches will be sold to Italian packers. ("Suisan Keizai Shimbun," June 20, 1967.)

* * *

SALMON FISHING IN CHUKCHI SEA BEGINS

The Japanese firm Hoko Suisan's fishing vessel "Dairin Maru No. 10" (299 gross tons), which ended gill-net herring fishing in the Bering Sea, was proceeding to the Chukchi Sea to begin fishing for salmon July 1. The Bering Sea gill-netting operation was conducted experimentally to capture egg-bearing herring. It failed to attain the 144-ton catch target. ("Shin Suisan Shimbun Sokuho," June 27, 1967.)

* * *

TAIYO POT FISHES TANNER CRAB IN WESTERN BERING SEA

Taiyo Fishing Company sent its freezer carrier "Banshu Maru No. 5" (3,567 gross tons) and 2 catcher vessels to the western Bering Sea off Cape Ozernoy, Kamchatka Peninsula, for exploratory tanner crab pot fishing. The catcher vessels, each carrying 500 crab pots, began fishing in early June, but results as of mid-month had not been good.

Taiyo plans to continue the operation to determine the potential for developing a commercial fishery. Catches will be frozen, brought back to Japan to be packed in cans primarily, but some also will be marketed frozen. ("Shin Suisan Shimbun Sokuho," June 16, 1967.)

* * *

TRAWLER ENDS OPERATION OFF U. S. EAST COAST

The Japanese trawler "Kaimon Maru" (2,500 gross tons) ended operations off the U. S. east coast on June 20 and returned to the fishing base at Las Palmas, Canary Islands. She had been sent on an exploratory cruise to the western Atlantic in early May 1967 by the Japan Overseas Trawlers Association.

The vessel surveyed the waters from Florida northward to 42°28' N. latitude (off New

York). In 45 days of operation, to June 15, it landed 530.92 metric tons of fish, mostly butterfish. In some areas, red snapper, highly esteemed in Japan, were abundant; catches up to 23 tons were landed on some days. Off New York, heavy concentrations of herring were located, but fishing fell off rapidly from June 15.

On the whole, fishing was very spotty. The Association believes that problems still remain to be solved before operations can be conducted commercially. ("Shin Suisan Shimbun Sokuho," June 22, 1967.)

* * *

PERMITS ONE-BOAT PURSE SEINING FOR COASTAL MACKEREL

The Japanese Fisheries Agency announced that, beginning November 1967, it will license one-boat purse seiners in the mackerel fishery off Japan's Pacific coast. Now only two-boat seining is permitted. The new policy will enable mackerel fishermen to fish in more distant offshore waters where, presently, single purse-seine vessels are permitted only for tuna fishing.

Two 100-gross-ton purse seiners, scheduled for completion in July and September, have been licensed to conduct trial mackerel fishing off the Pacific coast until October 1967. If successful, it may create a major trend toward one-boat purse seining in this mackerel fishery. ("Shin Suisan Shimbun," June 5, 1967.)

* * *

FIRM WILL LONG LINE RED SNAPPER IN WESTERN ATLANTIC

The Japanese fishing company Seiju Gyogyo has been authorized by the Government's Overseas Investment Liaison Council to form a local corporation in Saint Martin Island, Netherlands Antilles (east of Puerto Rico), to long line red snapper off that coast.

The Curacao Seiju Corporation, as it will be named, will be organized with a capital investment of US$150,000 in Seiju Gyogyo's 4 fishing vessels, "Seisho Maru" Nos. 2 & 5 (each 112 gross tons) and two 2-ton skiffs. This year's plans call for production of 508 metric tons of red snappers and 222 tons of groupers to be frozen and exported to nearby islands and to the U. S. ("Suisancho Nippo," June 13, 1967.)

* * *

LAB STUDIES ELECTRIC SHOCKER FOR TUNA TROLLING GEAR

The Shizuoka Fisheries Research Laboratory's gear development base at Ito launched a 3-year research program on April 1 to develop an electric shocking device for trolling gear to prevent the escape of tuna and yellowtail hooked on the line. The device will be designed to paralyze the fish at the instant of hooking--preventing their escape and facilitating retrieval.

The research is being conducted in cooperation with the Fishing Vessel and Gear Research Divisions of the Fisheries Agency. ("Suisan Keizai Shimbun," May 23, 1967.)

* * *

LARGE PURSE SEINER IS BEING BUILT

A 500-gross-ton U. S.-type purse seiner, largest of its kind in Japan, is now under construction at the Usuki Shipyards for the firm Kawajiri Gyogyo of northern Japan. The "Hakuryu Maru No. 55" is being built at a total cost of 320 million yen (US$888,889).

She will be equipped with various kinds of mechanical equipment, including a power block, wire reel, windlass, and power rollers. Upon completion, scheduled for mid-September, she will join the Nichiro Fishing Company's purse-seine fleet now off west Africa. ("Suisancho Nippo," June 22, 1967.)

* * *

REFRIGERATED CARRIER IS BEING CONSTRUCTED

A 3,800-gross-ton refrigerated fish carrier is being built at the Shimonoseki Shipyards in southern Japan for the Taiyo Fishing Company. The vessel, to cost 830 million yen (US$2.3 million), will have an overall length of 338.7 feet, a beam of 53.1 feet, and a depth of 27.8 feet. Main engines of 4,370-hp. will drive her at 15 knots. The refrigerated holds will carry 2,400 metric tons of fish and the freezing equipment will have a daily output of 55 tons. Upon completion in late September, the carrier will be placed in service on the West African run to haul trawl-caught fish back to Japan. The vessel is one of 4 similar-sized refrigerated carriers Taiyo plans to build to enlarge its fish carrier fleet. ("Minato Shimbun," June 8, 1967.)

Communist China

HER EXPORTS OF FISHERY PRODUCTS TO JAPAN INCREASE

Communist China's fishery exports to Japan have quadrupled in value during the last 4 years--from US$7.1 million in 1963 to $30.5 million in 1966. The total value of Japanese imports of all products from Communist China, however, also increased at about the same rate--from $74.6 million in 1963 to $306.2 million in 1966. So fishery imports still represent about 10 percent of total import value.

Japanese fishery imports from the USSR, though still small and worth only US$3.7 million in 1966, also increased significantly from 1963's $0.6 million. (U. S. Embassy, Tokyo, June 12, 1966.)

South Korea

PLANS NEW FISHERY

The South Korean factoryship recently purchased from Norway may be used in the North Pacific ocean perch fishery or in Malaysian territorial waters in a joint venture with Malaysia. No definite decision has been made. However, a later report indicates that she will be used in the North Pacific shrimp fishery by its owner, the Shin Hung Refrigeration Company. Negotiations are underway to make the venture, scheduled to begin in November 1967, a joint enterprise with Bumble Bee Seafood of Astoria, Wash. (U.S. Embassy, Seoul, May 31, and June 19, 1967.)

In 1966, the research vessel "Paekkyong-Ho" of the Pusan Fisheries College studied extensively Pacific ocean perch and shrimp in the North Pacific off Alaska and in the Bering Sea.

South Vietnam

U. S. AIDS SOUTH VIETNAM'S FISHERIES

The United States has agreed to contribute US$2,012,000 to the Food and Agriculture Organization, under the Freedom from Hunger Campaign, to aid a United Nations Development Program (UNDP) fisheries project in South Vietnam. Under the agreement, the U. S. contribution will help to expand the project's scope. FAO is conducting it for the UNDP at Vietnam's request.

Recent research in the South China Sea has indicated that a great increase in fish catch would be possible if traditional coastal operations could be modernized and expanded to include deep-water operations. Since fish provide a large portion of the protein in the average Vietnamese diet, this project could produce much-needed improvement in the food supply.

Original UNDP Project Was Limited

The original UNDP project called for $1 million from the Special Fund and $336,000 as Vietnam's counterpart contribution. It consisted of coastal surveys and feasibility studies. The U. S. contribution will enlarge the project to include investigations and feasibility studies for offshore and high-seas operations. It will enable FAO to charter a deep-water exploratory trawler, necessary equipment and personnel, including a UN expert.

The Netherlands also is planning to contribute to this enlarged project. (Press release, U. S. Department of State, May 26, 1967.)

India

PLANS INCREASE IN FISH PRODUCTION

India expects to make much progress during her "fourth plan" to augment the available food supply with fish. She plans to use 8,000 small mechanized boats; only 3,000 were supplied during the third plan. The diesel-engine boats will be constructed at home.

The Government reportedly has completed plans to obtain 58 trawlers for deep sea fishing. Fifty of them will be designed for local conditions; the other 8 will be modified. Total cost of the trawlers will be Rs. 60 million. The 8,000 mechanized boats will cost Rs. 480 million.

UN and Norway Help

India has entered into agreement with Norway and the United Nations to undertake

India (Contd.):

offshore and exploratory fishing. Practical training and demonstrations in modern technology will be given ashore and at sea.

The agreement provides for completion of some construction works--fish meal plant, slipway, and other harbor works. Norway will provide Rs. 42 million in grants and credits, and India will supply land, buildings, and installations. ("Fishing News International," June 1967.)

Malaysia

SABAH FISHERIES MAKE PROGRESS

The East Malaysian State of Sabah announced on June 30 that its shrimp fisheries are progressing well and that "more than M$10 million (US$3.3 million) was netted last year from prawn catches." By the end of 1968, the Sabah State Department of Agriculture and Fisheries hopes to have more than 200 shrimp trawlers; at present, there are only about 170.

A spokesman pointed out: "It is not true that licenses given to shrimp trawlers do not allow the catching of fish. It was because the fish caught was of poor quality that the fishermen had to throw them back into the sea."

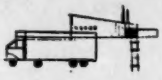
He said that about 150 trawling licenses have been issued so far--most to local fishermen. Of these, only about 30 were issued to joint enterprises of Malaysian and foreign firms. The Government also has provided its own trawlers to demonstrate methods and train local fishermen. It also sends several fishermen to West Malaysia for training from time to time.

New Methods Supported

The spokesman stressed that it was Government policy to introduce new methods of fishing. This has been its policy even before Sabah joined Malaysia. Good progress is being made.

The State Government has approved establishment of a large fish meal plant in Sandakan, the spokesman said. One of the biggest sea food companies in West Malaysia, now operating at Ipoh in Perak State, will set up the plant as soon as market and feasibility studies are finished. The plant would produce animal feed and components for fertilizers--for domestic consumption and for development into an important export item. The plant would use low-quality "trash" fish, abundant in Sabah waters. At present, the bulk of such fish is wasted; in many cases it is thrown back into the sea.

There are two shrimp freezing plants at Sandakan, Sabah: one owned by a Philippine-U. S. group, the other by a joint Malaysian (Chinese)-Japanese firm. Reportedly, there is also a freezing plant in Labuan. (U. S. Consulate, Kuching, July 7, 1967.)



Philippines

SETS UP FOREIGN CURRENCY DEPOSIT SYSTEM FOR FOOD IMPORTS

To reduce the outflow of foreign currency, the Philippine Government has established a foreign currency deposit system for food importers applying for loans. Food items on the import list have been grouped into 4 classes according to their importance as essential food. Foreign currency deposit rates have been set for each class, with higher rates imposed on less important items.

Deposit rates for each class are: Class I--25 percent; Class II--50 percent; Class III--75 percent; and Class IV--150 percent. Fishery products such as canned saury, sardine, salmon, and mackerel are in Class I. However, it is reported that importers normally have to deposit more when establishing credit for letter-of-credit transactions, so it appears that Philippine imports of those products will decline sharply.

Canned squid, which come under Class IV, have become virtually impossible to import. ("Kanzume Nippo," July 7, 1967.)

SOUTH PACIFIC

Australia

SHRIMP PRODUCTION RISES

Big catches in Western Australia and higher overseas prices could make 1966/67 a record year for Australian shrimp exports.

Exports totaled 1.8 million lbs. for 9 months of the current financial year (July 1-June 30). This was 20 percent more in quantity and 42 percent more in value than for the same period in 1965/66.

The 1964/65 financial year was a record one for shrimp exports--2.4 million lbs. The 1965/66 exports totaled 2.2 million lbs. In the 9 months to March 31, 1967, Western Australia exported 1.2 million lbs., Queensland 500,000 lbs., and New South Wales (N.S.W.) 100,000 lbs. Compared with the same period in the previous year, this was a 70 percent increase for Western Australia and a 29 percent increase for N.S.W. Queensland exports fell 17 percent.

Japan, the U. S., and France (Australia's main customers) are paying more this year than they did in 1964/65. ("Australian Fisheries Newsletter," June 1967.)

* * *

SHRIMP TRAWLER LAUNCHED

A 64-ft., all-steel welded, double-rigged trawler for shrimp fishing in Western Australia was launched recently in Fremantle. Named "N.W. Carnarvon," she was sent down the ways by the wife of the West Australian Fisheries Minister. The owning company hopes the vessel will be a prototype for an enlarged type of trawler it considers needed for operations off northern Australia. At first, the vessel will be working with shrimp in ice, but various methods of preserving the catch will be tried.

Designed Along U. S. Lines

The wide beam (20 ft.) provides a good working platform. Extra tanks for fuel and fresh water allow her to stay at sea for 3 or more days.

The roomy wheelhouse contains a separate cabin for the skipper, a galley, and shower room. There are accommodations for 4 crewmen forward.

N.W. Carnarvon is designed along American lines. It incorporates the refinements of shrimp trawlers that operate in the Gulf of Mexico. The company's general manager spent some time at sea last year with the Gulf of Mexico fleet. ("Australian Fisheries Newsletter," June 1967.)

* * *

TUNA CATCH IS POOR

The South Australian tuna catch for 1967 is likely to be only a little more than half of 1966's. With the season practically over, the catch in late May totaled 3,510 short tons--3,099 tons less than in 1966.

The New South Wales catch for 1966/67 was 2,363, 188 tons more than in 1965/66.

There may be 2 reasons for the poor season in South Australia: overfishing of stocks--the adults by the Japanese, and the juveniles by Australian fishermen--or a change in the normal migratory pattern of tuna schools. ("Australian Fisheries Newsletter," June 1967.)

American Samoa

ASIAN GROUP WILL NOT PARTICIPATE IN U.S. SAMOAN TUNA PRICE TALKS

The American Samoa tuna price group formed at the recent Asian tuna conference in Tokyo will not participate in the tuna price negotiations between Japanese trading firms and U. S. packers in American Samoa. This was reported by the Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN), sponsors of the conference.

NIKKATSUREN was informed by the Japanese firms that various financial and legal problems prevented participation of South Korean, Formosan, and Okinawan tuna producers in the price talks at the present time. ("Katsuomaguro Tsushin," June 23 and 18, 1967.)

AFRICA

South Africa

CANNED PILCHARD SALES IN UNITED KINGDOM ARE UP

The increase in sales of South African canned pilchards on the United Kingdom market has been so dramatic it has mystified even those marketing executives concerned with their distribution. "It was a great achievement," declared one sales manager, "but it was surely the marketing mystery of the year."

Marine Products Limited increased exports to the United Kingdom from 776,866 cases in 1965 to 1,034,800 last year. One journalist covering the British food market remarked that even the agents selling South African pilchards did not know the reason for the 25 percent increase although he remembered one advertising man connected with pilchard publicity commenting:

"We would like to think that the sales growth is partly due to our efforts but we are afraid that a lot of pilchards are bought for cats."

This year, reports the London journalist, around £50,000 (US$140,000) will be spent on advertising two canned pilchard brands. Some of the money allocated to advertising other brands, while not normally involving pilchards, will help their sales along.

"Marketing of South African pilchards has been consistently sound, rather than spectacular. It is a value-for-money product which may have benefited from the wage freeze and the growth in unemployment.

"And while prices have gone up, they have not risen by anything like the extent of many other canned foods. So whether they are eaten by mother, the kids, or the cats, who cares? It's nice business." ("South African Shipping News and Fishing Industry Review," May 1967.)

Tanzania

SOVIETS AID FISHERY

In April 1967, a three-man team of Soviet fishery aid technicians recommended to the Tanzanian Government the construction of a $140,000 fish-drying plant at Kigoma, at the northeastern shore of Lake Tanganyika. The team spent one week determining the catchability rates of Tanganyika Lake whitebait (Stolothrissa tanganicae), and studied the suitability of the plant's future location. If the Tanzanian Government approves the project, the USSR will finance it from the almost $20 million credits Tanzania obtained in May 1966. ("The Standard," April 17, 1967.)

Senegal

SOVIETS AID SENEGAL'S FISHERIES

Senegal's Minister of Agriculture, Magatte Lo, and Department of Oceanography and Marine Fisheries Director Arnoux flew to Moscow June 28 for a 10-day meeting with Soviet officials. They discussed implementation of the March 1965 Senegal-U.S.S.R. Agreement on Marine Fisheries.

The 1967 Protocol of Cooperation, signed in Moscow, provides for (1) exchange of fishery experts and of scientific and technical fisheries and oceanographic information; and (2) joint biological research in tropical eastern Atlantic. ("Tass," June 28, 1967.)

The Tass release does not mention the building of a tuna cannery in Senegal, although Article 1 of the March 1965 Agreement specifies that the Soviet Government "agrees to supply technical cooperation. . .in constructing a fish canning factory of a capacity of 6 metric tons of raw material per one hour or 15,000-20,000 tons per year, working in two shifts."

ARTICLES

In the North Gulf of Mexico, this system caught during daylight 96 to 109% of shrimp caught at night by nonelectric trawl; in the southeastern Gulf, catch rate was 50%.

DEVELOPMENT OF THE ELECTRO-SHRIMP TRAWL SYSTEM

By Norman L. Pease* and Wilber R. Seidel**

The Gear Research Unit of the Exploratory Fishing and Gear Research Base in Pascagoula has developed an electrical shrimp trawl capable of catching nocturnally active species of shrimp during the day. As part of the project, over 1,000 shrimp were stimulated with various electrical fields to determine the necessary characteristics--a minimum field of 3.0 volts at 4 to 5 pulses per second. The staff then designed and built a prototype electro-shrimp trawl system.

In the system, the vessel's generator produces alternating current, which is transmitted by an electrical cable to an electronic pulse generator on the trawl door; here the current is converted to direct current and is then released at a specified pulse rate to an electrode array on the trawl.

Fishing trials on the mud bottom in the north Gulf of Mexico indicated that the system could catch, during daylight, 96 to 109 percent of the shrimp caught at night by a nonelectrical trawl. In the southeastern Gulf, on a calcareous sand-shell bottom, the catch rate was 50 percent.

The shrimp industry in the Gulf of Mexico has grown impressively during the last three decades. In 1934, the exvessel landing value of shrimp was $1.9 million; by 1966, it had grown to $82.8 million. During this period shrimping techniques were refined, such as double-rigged trawling (Knake, Murdock, Cating, 1955), and vessel design was improved (Juhl, 1966). Additional modifications, such as the change from cotton to synthetic webbing, helped increase the strength and useful life of trawls. Various designs of tickler chains, mud ropes, and rollers were developed by fishermen to help increase the catch or to adapt the shrimp trawl to fishing areas not previously worked. New shrimp handling and processing equipment afloat and ashore have been designed and developed for the commercial fishing industry ("Fish Boat," 1966a, 1966b). Collectively, these innovations have contributed to the expanding shrimp industry.

Trawling for the pink shrimp (Penaeus duorarum) and the brown shrimp (P. aztecus), however, has continued to be regulated by the shrimp's daily activity cycle. These shrimp burrow in the bottom during daylight, apparently for protection from predators, and come out at night to forage for food. Commercial fishing, therefore, is restricted to night trawling when the shrimp are available--effectively reducing the fleet's fishing activity at sea almost 50 percent.

To increase the fleet's efficiency, it was necessary to find a method that would catch shrimp while they are normally burrowed in the bottom and not available to conventional gear. The BCF Gear Research Unit at Pascagoula proposed to develop equipment that would permit the expansion of the existing night shrimp fishery into a 24-hour-a-day fishery. The harvesting system would use electricity to make shrimp come out of the

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U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 796

bottom involuntarily, where they could be captured.

SHRIMP BEHAVIORAL STUDIES

Higman (1956) established that a pulsed direct current produced definitive behavior patterns in shrimp and that increasing the strength and duration of electrical impulses induced variations in behavior. Kessler (1965) used capacitor discharge pulses to determine the threshold electrical voltage needed to produce a hopping response in shrimp.

In 1964, the BCF Gear Research Unit began shrimp behavior studies to determine optimum electrical requirements needed to stimulate burrowed shrimp (Klima, MS). These studies were made in the eastern Gulf of Mexico on different bottom types using various electrical voltages and pulse rates. Over 1,000 burrowed shrimp were stimulated electrically to determine the best combination of voltage and pulse rate needed to force shrimp out of the bottom. SCUBA divers placed individual shrimp on the bottom and allowed them to burrow. Then a diver using a 16-mm. movie camera filmed an entire sequence: from the initial activation of the electrical field to the shrimp emerging from the bottom and swimming up into the water.

A frame-by-frame analysis of all the resultant film footage was used to determine the elapsed time each shrimp took to reach a position 3 inches above the bottom. Under optimum electrical conditions, the average time to reach this height was 2.0 seconds. We determined that the width of the electrical field in front of the trawl should be 8 feet by using the 2-second interval and a trawl dragging speed of 4 feet per second (2.5 knots). In relation to the trawl speed and the width of the electrical field, the optimum electrical characteristics were found to be 3.0 volts at 4 to 5 pulses per second.

Upon completion of this phase of the project, the engineering staff began designing and fabricating components for the system.

DESCRIPTION OF SYSTEM

The use of continuous direct current in seawater would require large amounts of electricity from generators of prohibitive size and cost. Therefore, the electro-shrimp trawl system uses a pulsed direct current field to force shrimp out of the bottom. The system has a power control panel, power supply cable, pulse generator, electrode array, and a 40-foot Gulf of Mexico shrimp trawl (fig. 1). Alternating current from a ship's generator is converted to a capacitor discharge pulse by the underwater pulse generator, which can be attached to either the port or starboard trawl door when using a single trawl.

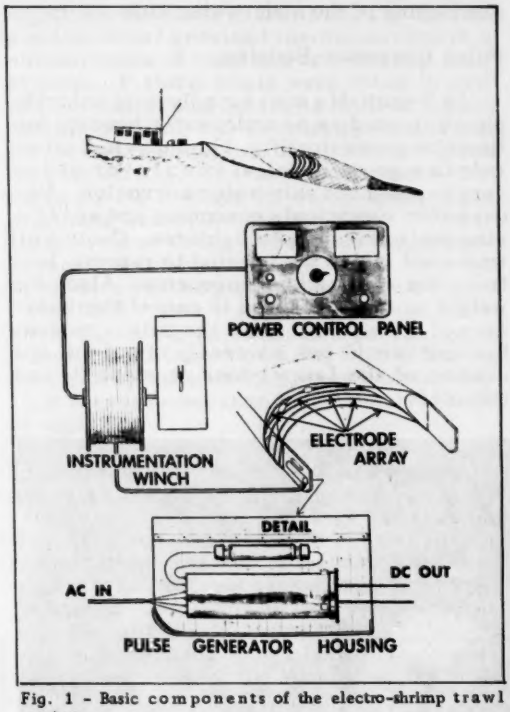

Fig. 1 - Basic components of the electro-shrimp trawl system.

When towing 2 trawls simultaneously, the pulse generator for each trawl should be attached to the inboard door to facilitate its handling. The output of the pulse generator is supplied to the electrode array, which is towed in front of the footrope on the trawl and creates the electrical field. This low voltage field causes an involuntary "jumping" response in shrimp that are burrowed during daylight and not available to nonelectrical shrimp trawls. The jumping response forces the shrimp out of the bottom.

Power Control Panel

The power control panel was used to check the alternating current input, capacitor voltage, and pulse rate of the underwater pulse generator. Alternating current was supplied to the underwater unit through a variable transformer. A direct-current voltmeter on the control panel showed voltage readings on the output of the pulse generator. Although 2 conductors in the power supply cable were required for this voltmeter, it was useful because it provided a continuous check on the functioning of the underwater unit.

Pulse Generator Housing

An 8-inch diameter polyvinyl chloride pipe was used as an underwater housing for the pulse generator (fig. 2). Polyvinyl chloride is a good electrical insulator and is very resistant to salt-water corrosion. Underwater electrical connectors and an "O"-ring seal ensured watertightness. Cooling oil was used inside the housing to remove heat from the electrical components. Also, the weight of the oil served to cancel the buoyancy of the housing so that the pulse generator unit would not adversely affect the operation of the trawl door on which it was mounted.

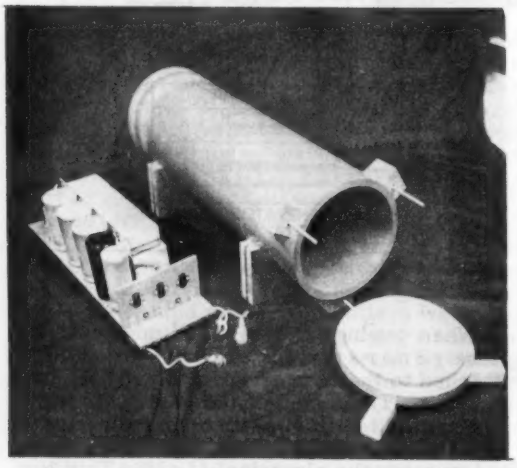

Fig. 2 - The pulse generator and its underwater housing.

Power Supply Cable

A neoprene-coated power supply cable (fig. 3) containing 4 American wire gage No. 12 wires was used during field tests and fishing trials of the electrical trawl. Two conductors supplied alternating current from boat to pulse generator. The other 2 conductors were used to return voltage readings from pulse generator capacitor bank to direct-current voltmeter on the control panel.

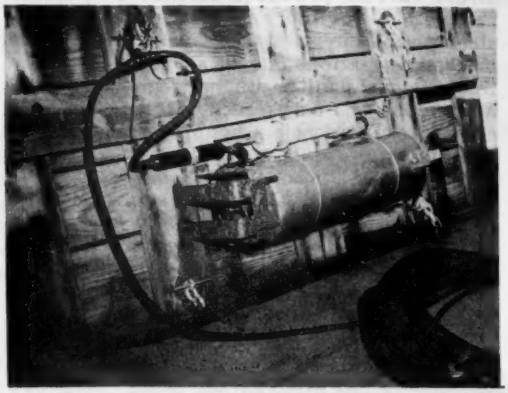

Fig. 3 - Power supply cable coiled beside the trawl door on which the pulse generator is mounted.

Electrode Array

Through the shrimp behavior studied, it was determined that an array about 8 feet deep was needed to provide the necessary stimulation time for a trawl moving 2.5 knots. Therefore, the electrode array comprises 5 parallel bare conductors spaced 2 feet apart from each other at the center of array (fig. 4). Any noninsulated, flexible, copper alloy cable, about $\frac{3}{8}$-inch diameter, can be used for the electrode material if it is durable enough to withstand the constant chafing of the ocean bottom. During the field

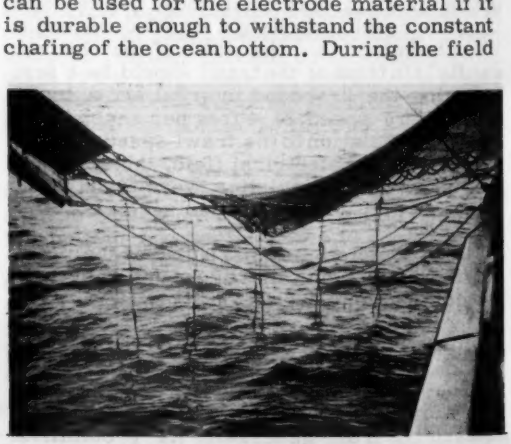

Fig. 4 - The electrode array installed on the electrical trawl during field trials.

trials, we used a wire with 6 strands--3 strands of insulated stainless steel wire for strength and 3 of noninsulated copper wire for current carriers. The strength and electrical characteristics of this wire proved satisfactory.

Operating Characteristics of System

The pulse generator was designed to satisfy the electrical characteristics developed during behavior studies. The minimum field voltage occurs at the center of the electrode array because the electrodes are farthest apart at this point. Because of the electrode array's shape, space between electrodes decreases toward each end of the array; this results in an increased field voltage in these areas. The alternating current power requirement of an electro-shrimp trawl system is 110 volts and 20 amperes. The ship's generator should provide a minimum of 3 kilowatts for each electrical trawl. A 12- or 32-volt system cannot be used to power this electro-shrimp trawl system.

ENGINEERING FIELD TESTS

Field tests of a prototype electro-shrimp trawl were performed aboard the R/V "George M. Bowers". SCUBA divers on towed diving sleds made observations and film recordings of gear performance. These showed that the electrode array and the underwater pulse generator housing were compatible with the trawl and did not adversely affect the trawl performance. Operational tests were made during several cruises to check the system's operation and reliability. Several component changes and minor design modifications were made before the unit was ready for fishing trials.

FISHING TRIALS

Methods

The George M. Bowers was rigged with 2 standard 40-foot Gulf of Mexico shrimp trawls (Bullis, 1951). The electro-shrimp trawl system was installed on the starboard trawl, and a standard $\frac{3}{8}$-inch galvanized chain tickler was attached to the port trawl. Loop chain was hung on the footrope of the electrical net to cause it to tend bottom close enough so that electrically stimulated shrimp would be caught at a minimum vertical distance of 3 inches off the bottom. An equal amount of chain was added to the nonelectric net.

Except for these modifications, the 2 trawls were identically rigged so that differences in the amount of shrimp caught in the 2 nets could be attributed to the electrical system on the starboard trawl. Other factors that could affect catch rates were minimized by comparing a large number of drags in one area.

To determine the catching ability of the electric trawl, both trawls were dragged simultaneously day and night. Comparison of the individual trawl catch rates for the nighttime nonelectric trawl and the daytime electric trawl provided the measurement of effectiveness of the electro-shrimp trawl system. Fishing trials were made in several areas within the major Gulf of Mexico shrimp grounds off Mississippi and Texas for brown shrimp, and off southern Florida for pink shrimp. One-hour drags were first made during daylight on each area. Then, beginning immediately after sunset, additional 1-hour drags were made in the same area worked during the day. This day-night procedure was repeated numerous times. From the 24-hour test cycles on each major shrimp ground, we obtained a percentage of effectiveness based on catches of shrimp caught by the electrical trawl during daylight versus those taken by nonelectric trawl at night.

Results of Fishing Trials

Table 1 is a summary of the shrimp catches and catch rates for the electric and nonelectric trawls in the 3 major grounds. A comparison of average catches taken during the fishing trials is presented in fig. 5.

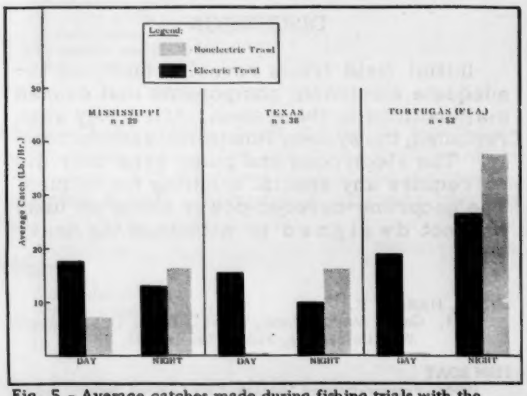

Fig. 5 - Average catches made during fishing trials with the electro-shrimp trawl.

Table 1 - Summary of Trawl Catches Taken During Comparative Fishing Trials with the Electro-Shrimp Trawl

Time	Trawl	Mississippi Grounds			Texas Grounds			Tortugas Grounds		
		Drags	Total Catch	Catch Rate	Drags	Total Catch	Catch Rate	Drags	Total Catch	Catch Rate
		Number	Lb.	Lb./1 Hr.	Number	Lb.	Lb./1 Hr.	Number	Lb.	Lb./1 Hr.
Day	Electric	19	336.5	17.7	18	278.5	15.5	29	548.5	18.9
Day	Nonelectric	19	139.5	7.3	18	9.5	0.5	29	24.5	0.8
Night	Electric	10	130.0	13.0	20	197.8	9.9	23	609.5	26.5
Night	Nonelectric	10	162.5	16.3	20	324.0	16.2	23	866.5	37.7

In the 2 northern Gulf grounds off Mississippi and Texas, the average daytime shrimp catch with the electric trawl was 17.7 and 15.5 pounds per hour, respectively. On the Tortugas shrimp grounds, the average daytime catch by the electric trawl was 18.9 pounds per hour. Nighttime nonelectric averages for the three grounds were 16.3, 16.2, and 37.7 pounds per hour, respectively. All shrimp weights are with heads on.

Table 2 - Day-Night Effectiveness of Electro-Shrimp Trawl System

Catch Comparison	Mississippi Grounds	Texas Grounds	Tortugas Grounds
	(Percent)		
Daytime electric trawl/nighttime nonelectric trawl	109	96	50
Nighttime electric trawl/nighttime nonelectric trawl	80	61	70

Table 2 presents the effectiveness of the electrical shrimp trawl obtained by comparing the average catches from each fishing ground (daytime electric trawl/nighttime nonelectric trawl). Off Mississippi and Texas, the daytime electric trawl caught 109 percent and 96 percent of the nighttime nonelectric catch, but on the Tortugas shrimp grounds the catch rate dropped to 50 percent.

DISCUSSION

Initial field trials revealed faulty or inadequate electronic components that caused malfunctions in the system. After they were replaced, the system functioned satisfactorily. The electrodes and pulse generator did not require any special handling techniques. The neoprene-covered power cable we used was not designed to withstand the heavy strain or chafing normally encountered with trawling gear. Therefore, we were cautious and controlled the cable by hand to complete our tests, but we recognize its limitations for commercial use. An armored cable that also could function as the trawl warp would be the best solution. Several wire manufacturers are now developing a cable suitable for this purpose.

Klima demonstrated that electrically stimulated shrimp emerge faster and jumped higher from a mud substrate than from any other bottom type. This was substantiated during our fishing trials where the catch ratio was highest on the mud substrate common to the shrimp grounds in the northern Gulf. The catch ratio was reduced almost 50 percent on the Tortugas shrimp grounds, where the substrate is primarily calcareous sand-shell material.

The nighttime electric trawl catches were consistently less than nighttime nonelectric trawl catches (table 2). Based on comparable catch data, about 20 to 40 percent of the available shrimp were not being caught with the electrical trawl system when it was dragged at night. We were not able to obtain data that specifically indicate the reason for this lower catch ratio. Studies of the nocturnal behavior of pink shrimp, however, have shown that they come out of their burrows during the night to forage on the bottom (Fuss, 1964). If we assume that shrimp were foraging during the nighttime fishing trials, they could use the time interval required during daytime to emerge from the bottom to swim out of the electrical field. Those shrimp located in the area of the approaching trawl wings would thus have the opportunity to evade the trawl.

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OLD ITALIAN FAVORITE BECOMES NEW SEAFOOD SLIMMER

Taking a cue from the Italians, a new low calorie salad, Sea Garden Antipasto, is stealing the show at luncheons these days. Maine sardines are featured in this production, but equally talented standby stars are ready to go onstage. Lobster, tuna, crab, pickled herring, or shrimp may be substituted for sardines to present a seafood spectacular. The sardines and mushrooms are marinated and chilled in a low-calorie French dressing mixture made interesting with soy sauce, ginger, garlic, and wine vinegar before being served on lettuce leaves with a variety of crisp, garden-fresh vegetables.

Sea Garden Antipasto is one of many new ideas that make dieting fun with fish and shellfish in a new, 16 page, full-color booklet, Seafood Slimmers, just released by the United States Department of the Interior's Bureau of Commercial Fisheries. It is available for 25¢ from the Superintendent of Documents, Washington, D. C. 20240.

SEA GARDEN ANTIPASTO

3 cans (3-3/4 or 4 ounces each) Maine sardines
2 cans (4 ounces each) button mushrooms
Marinade
6 large lettuce leaves
24 cucumber slices
18 celery sticks
12 radish roses
12 tomato wedges
6 green pepper rings

Drain sardines and mushrooms. Place in shallow baking dish. Pour marinade over sardines and mushrooms and chill for 30 minutes. Prepare vegetables and chill. Remove sardines and mushrooms from marinade. Drain. Arrange all ingredients, except the marinade, attractively on lettuce leaves, dividing the ingredients evenly among the 6 servings. Serves 6. Approximately 130 calories in each serving.

MARINADE

1/2 cup low calorie French dressing
1/4 cup soy sauce
2 tablespoons wine vinegar
2 tablespoons water
1 clove garlic, crushed
Dash powdered ginger
Dash pepper

Combine all ingredients and mix thoroughly. Makes approximately 1 cup marinade.

THE ATLANTIC SURF CLAM FISHERY IN 1966

By Thomas M. Groutage and Allan M. Barker*

The fishery for Atlantic surf clams (Spisula solidissima) landed a record 45 million pounds of clam meats in 1966. New Jersey landings, centered at Point Pleasant, composed 96 percent of the total. Less than 2 percent of the total landings was used for fish bait. Sampling at Point Pleasant, Barnegat, Cape May, and Wildwood, N. J., provided data on the fishery. Daily catches averaged 332 bushels at Point Pleasant and 315 at Wildwood; both averages are less than those for 1965. Clams landed for processing had a mean shell length of 151 mm. (6 in.) at Point Pleasant and 130 mm. ($5\frac{1}{8}$ in.) at Wildwood.

The surf clam industry has developed rapidly since the early 1940's and is a major contributor to total shellfish production. In 1966, the fishery produced about 32 percent of the U. S. molluscan shellfish landings and was second only to the oyster fishery. This report is the second designed to document the expansion of the fishery and to summarize statistics. The 1965 data were reported by Groutage and Barker (1967)[1].

FISHING AREA

Surf clams were dredged from two principal areas along the New Jersey coast. The largest and most productive grounds were between Barnegat Lightship and Point Pleasant (fig. 1). Point Pleasant, the center of commercial landings, had an operating fleet of about 45 vessels, an increase of 5 over 1965. During the year, two to five vessels were based at Barnegat Inlet and one to three at Atlantic City. Depth of clam beds in the Barnegat Lightship-Point Pleasant fishing area ranged from 15 to 34 meters (48 to 110 feet); average depth was 22.5 meters (74 feet).

About 10 boats operated out of Cape May-Wildwood. Water depths in this fishing area (fig. 1) ranged from 7 to 21 meters (24 to 70 feet) and averaged 10.7 meters (35 feet). Fishing effort was concentrated in the inshore area.

GEAR AND METHODS

Most surf clam boats made 1-day trips; some Point Pleasant boats made 2-day dredging trips off Long Island. Length of dredging time per trip varied from 1 to 22 hours (average 9.5) at Point Pleasant and from 1 to 11 hours (average, 6.0) at Wildwood. Compared with 1965, fishing time increased slightly (from 8.9 to 9.5 hours) at Point Pleasant and decreased slightly (from 6.4 to 6.0 hours)

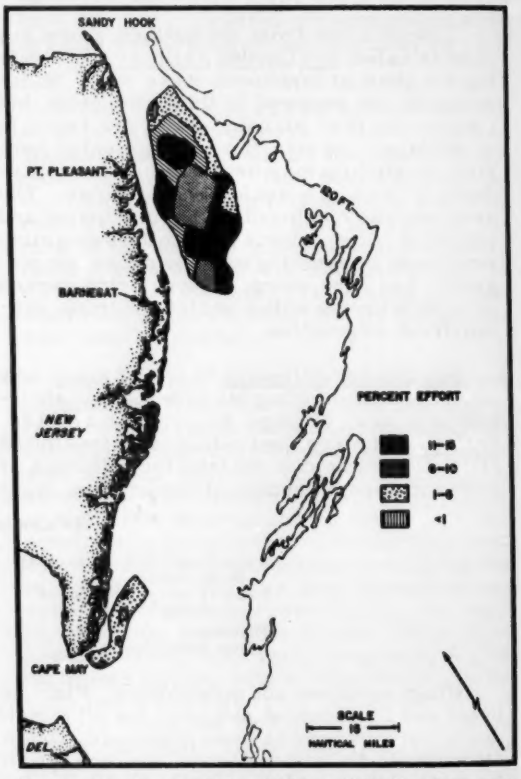


Fig. 1 - Location of surf clam dredging off the New Jersey coast in 1966 (percentage of total New Jersey effort).

*Fishery Biologists, BCF Biological Laboratory, Oxford, Maryland.

1/Groutage, Thomas M. and Allan M. Barker: 1967. The surf clam fishery. U. S. Fish and Wildlife Service, "Commercial Fisheries Review," vol. 29, no. 2, pp. 55-58 (also Sep. No. 780).

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 797

at Wildwood. Towing time per dredge haul remained at an average of 4 tows per hour. Eight boats entered the fishery; seven were converted vessels and one was a metal boat specifically constructed for surf clam dredging.

LANDING STATISTICS

Over 1,400 interviews of vessel captains were obtained for information on fishing location and effort, and 10,500 commercial-size clams in 883 samples from landings were measured. Seven trips were made on commercial vessels, where 1,500 clams were measured from catches in 115 dredge hauls. The amounts of surf clams landed along the Atlantic coast were taken from "Current Fishery Statistics".

Total landings of 45 million pounds of surf clam meats in 1966 set a new record. The previous high was 44 million pounds in 1965 (Groutage and Barker, 1967). Greater demand for the product and higher prices to the fishermen led to an in increase in total effort and to the rise. Ninety-six percent (43.2 million pounds of meats) of the total landings were made in New Jersey, 4.0 percent (1.8 million pounds) in New York, and 0.2 percent (60,000 pounds) in Maryland. Only about 2.2 percent of the total U. S. catch was used for bait in sport fisheries; included were 1.4 percent (600,000 pounds) of the catch in New Jersey, 21 percent (387,000 pounds) in New York, and 4.7 percent (3,000 pounds) in Maryland.[2/] Compared with 1965, landings increased in New Jersey and New York and decreased in Maryland. Landings in Rhode Island and Massachusetts remained insignificant and were used entirely for bait.

Nearly 76 percent (32.4 million pounds of meats) of the New Jersey landings were made at Point Pleasant and Barnegat, compared with over 79 percent (33.5 million pounds) in 1965. Winter weather in 1966 restricted dredging in deeper waters. Daily landings per boat at Point Pleasant ranged from 21 to 1,061 bushels (353 to 18,044 pounds of meats) and averaged 332 bushels (5,644 pounds). Average for 1965 was 355 bushels (6,035 pounds). Catch rate per hour of dredging (fig. 2) averaged 35 bushels (593 pounds of meats); in 1965, 40 bushels (678 pounds).

Clam landings at Wildwood (fig. 3) amounted to over 22 percent (9.5 million pounds of meats) of the New Jersey total; they were less than 20 percent (8.4 million pounds) in 1965. Monthly landings in Wildwood increased, generally, throughout the year (fig. 4). No boats moved from Point Pleasant to Cape May in the spring of 1966 (in contrast to 1965), but four

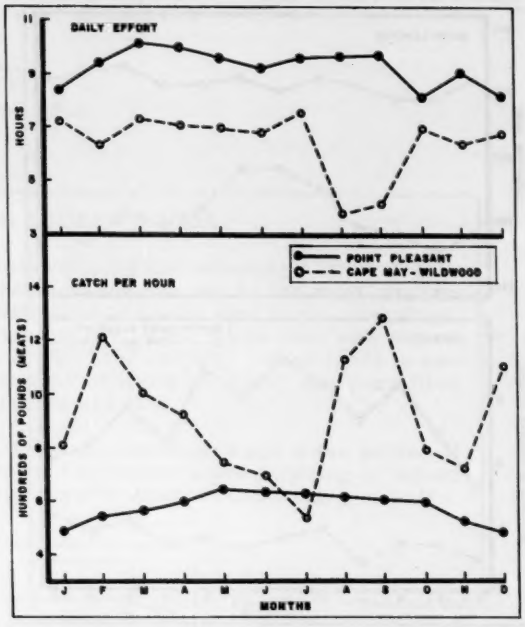


Fig. 2 - Monthly averages of daily effort and catch per hour at Point Pleasant and Cape May, N. J., 1966.

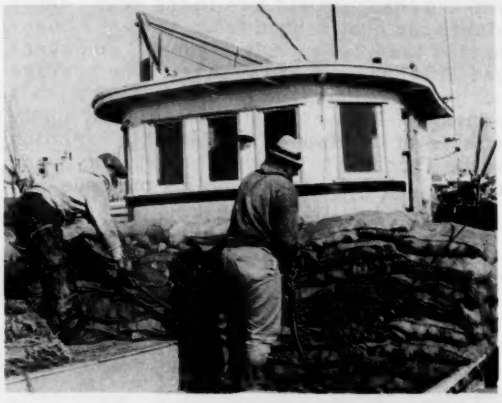


Fig. 3 - Unloading a day's catch of surf clams at Wildwood, N. J.

2/Data provided in personal communications from BCF, Office of Statistical Services, Fishery Reporting Specialists in the respective states.

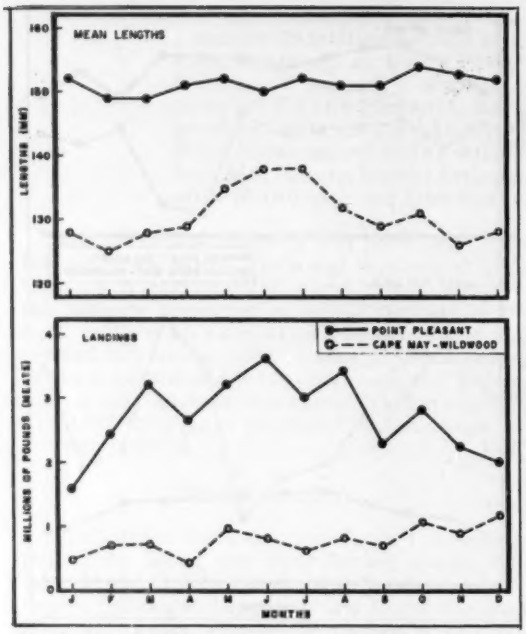


Fig. 4 - Mean lengths of surf clams and monthly landings of surf clam meats in New Jersey in 1966.

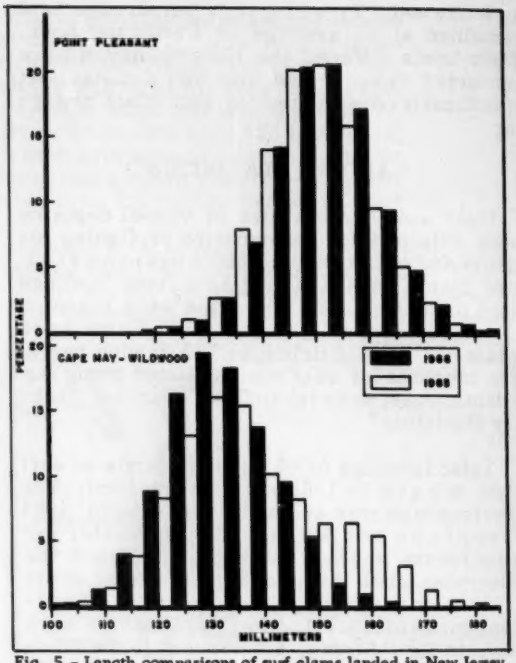


Fig. 5 - Length comparisons of surf clams landed in New Jersey in 1965 and 1966.

boats did change ports late in the year. Daily catches per boat ranged from 40 to 867 bushels (634 to 14,746 pounds of meats) and averaged 315 bushels (5,355 pounds). The average hourly catch rate was 53 bushels (893 pounds of meats). Hourly catch rates were highly variable at Wildwood (fig. 2). This variation can be ascribed to weather conditions, location of clam beds, and sampling methods.

Over 1.5 percent (653,000 pounds) of the New Jersey total catch of surf clam meats was landed at Atlantic City; in 1965, it was only 0.1 percent (43,000 pounds). Landings at Belmar in Monmouth County amounted to 0.9 percent (395,000 pounds) of the New Jersey total, compared with 0.8 percent (357,000 pounds) in 1965.

Monthly average lengths of surf clams landed at Point Pleasant were more uniform than those of clams landed at Cape May-Wildwood (fig. 4). The mean shell length of 6,485 clams, randomly sampled at Point Pleasant throughout the year, was 151 mm. (6 in.) and the range was 105 to 189 mm. ($4\frac{1}{8}$ to $7\frac{3}{8}$ in.). Figure 5 shows the 1965 and 1966 length frequencies; Point Pleasant clams had similar lengths in both years. Clams landed at Wildwood had a mean length less than that of Point Pleasant clams; for 3,637 Wildwood clams measured throughout the year, the range was 100 to 160 mm. (4 to $6\frac{1}{4}$ in.) and the mean length was 130 mm. ($5\frac{1}{8}$ in.). In 1965, the mean length of Wildwood clams was 139 mm. ($5\frac{1}{2}$ in.).

At Point Pleasant, amounts of small clams (less than 130 mm. or 5 in. long) discarded at sea were negligible--about 1 bushel per 200 bushels landed. In the Wildwood area, amounts of discarded clams (less than 115 mm. or $4\frac{1}{2}$ in.) were slightly greater (about 2 bushels per 200 bushels landed).

STATUS AND TRENDS OF THE FISHERY

Information from interviews with vessel captains indicated that fishing effort has increased over 1965's. The average length of surf clams caught in the Barnegat Lightship area has remained at 151 mm. (6 in.). The mean length at Wildwood, however, decreased from 139 mm. ($5\frac{1}{2}$ in.) in 1965 to 130 mm. ($5\frac{1}{8}$ in.) in 1966. Acceptance of smaller clams by some processors permitted clam boats to fish on the smaller, dense, inshore clam beds.

Increased demand for surf clam meats caused higher prices, which encouraged more effort by the fleet. The fishery continued the orderly expansion it has experienced for the past 20 years.

GUIDES TO HANDLING FROZEN FOODS

Proper handling is the decisive factor in developing and retaining a volume-getting frozen food department. Next to the consumer, the retailer is the most important factor in the expansion of frozen foods because he is next to the consumer. Consumers, in ever-increasing numbers, want and buy frozen foods--but only where they know that quality is assured. Packers lavish care on their frozen foods to assure quality. But results of this care are dissipated if the products are permitted to deteriorate in the store--sales and customers are lost.

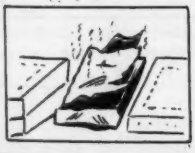
Frozen foods are profit-making foods. They win customers and make sales. It pays to take care of them. Here are 10 guides to the proper store handling of frozen foods--10 direction signs to the successful winning of customers and making of sales.

1. Nothing invigorates you like sunshine and fresh outdoor air, but they're death to frozen foods. Get that delivery off the sidewalk fast!

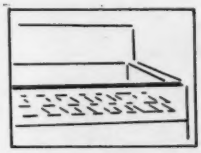
2. Rush the delivery to zero storage. Don't give it a chance to thaw. Frozen foods which defrost and are refrozen lose taste appeal and customers.

3. Frozen foods suffer damage when permitted to stand on the floor. Protect quality--get them off the floor and into the cabinet fast!

4. Don't leave anything in long enough to become frost-covered. Rotate stocks. Always take out old packages and place them on top of the new!



5. Customers won't buy torn, crushed, or frost-covered packages. So take your choice--either you'll get rid of them or they'll get rid of your customers.



6. Give customers maximum choice. Keep cabinets well-stocked at all times. Remember, the bigger the display, the bigger it sells.

7. Be a good housekeeper. Keep cabinets tidy. Work over them often. Customers buy only what they can see--let them see what you have.

8. The plateline is the defrosting line; stock nothing above it. And keep packages back from the glass front to let the cold air circulate.

9. Frozen foods become incurably ill above zero temperature. Keep that destructive fever down. Check cabinet temperature every morning and every night.

10. Stocks don't sell in the backroom. Order in just what you need between deliveries and a small reserve of fast-movers to avoid out-of-stocks.

AN EVALUATION OF SAMPLING TRAPS IN FARM PONDS

By James E. Ellis* and Kenneth L. Coon**

Channel catfish (Ictalurus punctatus) and blue catfish (Ictalurus furcatus) are now reared in ponds totaling several thousand acres in southeastern United States. Pond-reared catfish are sold as food fish and to operators of pay fishing lakes. In intensive fish culture, weekly samples of at least 100 fish are needed to check the growth and general well being of the fish. The aim of this study was to determine if various types of fish traps could take adequate samples of fish from the pond. Eight different types of traps were fished in a 9-acre catfish-rearing pond near Gould, Arkansas. All failed to catch 100 fish per week.

EQUIPMENT

We fished 9 traps--5 (1 to 5) were fabricated specially for this study; 4 (traps 6-9) were purchased from manufacturers.

Trap 1: A 2-foot square top made of $1\frac{1}{2}$-inch mesh hardware cloth and wooden strips (fig. 1). (All mesh sizes are bar measure.) The entrance, 2 inches high and 18 inches long, is formed by slanting wire walls from the trap top and bottom.

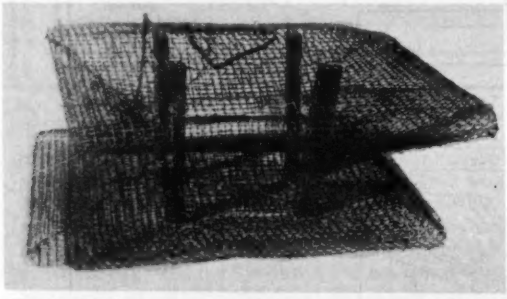


Fig. 1 - A 2-foot square trap with slanting wire walls, which form the trap entrance. Material is hardware cloth.

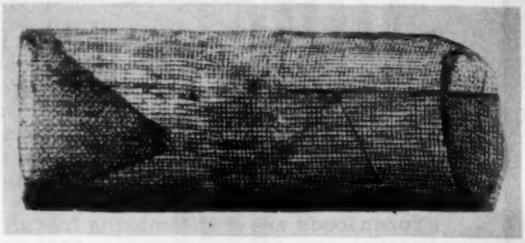


Fig. 2 - A cylindrical trap with one throat. Material is hardware cloth.

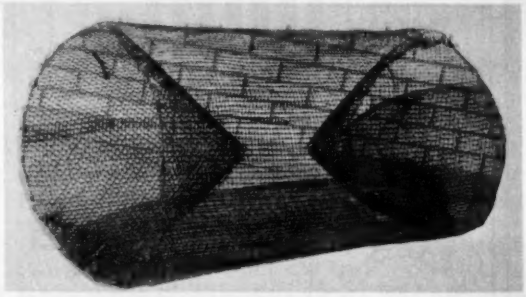


Fig. 3 - A cylindrical trap with two throats. Material is hardware cloth.

Trap 2: A $\frac{1}{2}$-inch mesh hardware cloth was used to build a cylindrical trap, 4 feet long by 19 inches in diameter (fig. 2). It has a single throat at one end that extends 14 inches into the trap and has a 2-inch diameter opening.

Trap 3: Cylindrical trap (fig. 3), constructed of 1-inch mesh hardware cloth; it has a throat at each end. The trap is 4 feet long and the diameter 2 feet. The throats extend 12 inches into the trap and have 2-inch diameter apertures.

Trap 4: A cross-shaped trap made of $\frac{1}{2}$-inch mesh hardware cloth (fig. 4). The four compartments that form the cross are 1-foot square and 2-feet high. Fish enter through 2-inch square swinging doors at the angles formed by the cross walls.

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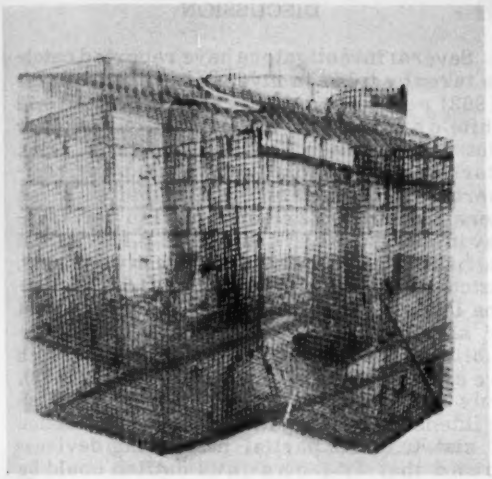

Fig. 4 - A cross-shaped trap with swinging doors located at the angles formed by the cross walls. Material is harware cloth.

Trap 5: A cylindrical trap, 4 feet long by 19 inches diameter, constructed of $\frac{1}{2}$-inch mesh poultry wire (fig. 5). A throat with a 3-inch aperture extends 22 inches into the trap.

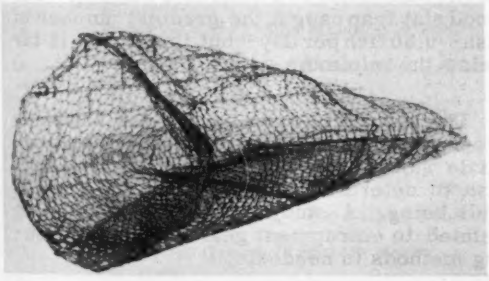

Fig. 5 - A cylindrical-shaped trap with one throat. Material is poultry wire.

Trap 6: A rectangular trap, 3 feet by 13 inches by 13 inches, made of one-inch mesh welded wire (fig. 6). A V-throat is formed by 2 slanting wire walls. Fish enter through two swinging doors, 5 inches by 2 inches, located at the throat base.

Trap 7: A wooden slat trap, 5 feet by 11 inches by 11 inches, made of white oak strips, 2 inches wide and $\frac{3}{8}$ inch thick with a $\frac{1}{4}$-inch space between them (fig. 7). Two throats formed by slanted oak strips are at one end, the outermost throat has an aperture of $5\frac{1}{2}$ inches and the inner throat aperture is 2 inches in diameter.

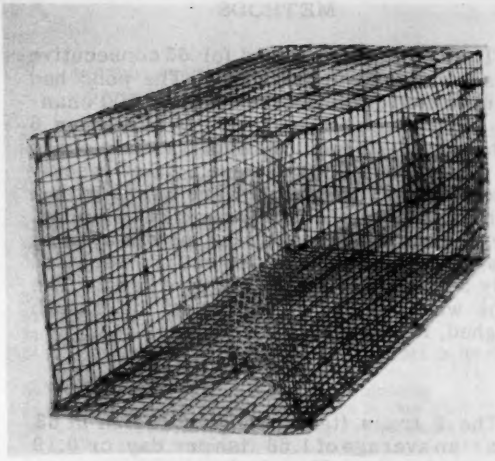

Fig. 6 - A rectangular trap with swinging doors. Material is welded wire.

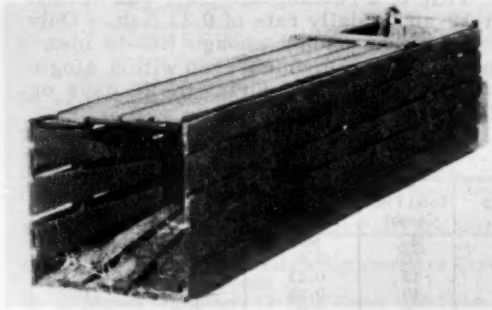

Fig. 7 - A slat trap with two throats. Material is wood.

Traps 8 and 9: Two 1-inch mesh nylon hoop nets were used. Each net has an overall length of $10\frac{1}{2}$ feet and 7 white oak hoops, 2 feet in diameter. The hoop net has two throats, one between the second and third hoops, and one between the fourth and fifth hoops. A 10-foot wooden strip was nailed to the hoops to hold the trap erect in still water.

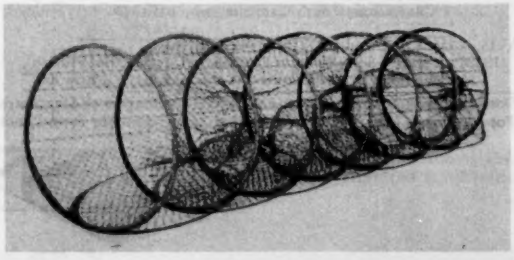

Fig. 8 - A hoop net with two throats. Material is nylon.

METHODS

The 9 traps were fished for 63 consecutive days during May to July 1965. The pond had been stocked in mid-March with 15,000 channel and blue catfish fingerlings averaging 6 inches long. A grid system was laid out in the pond and the traps were rotated weekly to avoid bias. All traps were baited with 1 pound of industrial cheese wrapped in burlap. The bait was attached near the middle of each trap. During the study, the catfish were fed daily 3 percent of their body weight. The traps were checked daily and the catch weighed, measured, and released.

RESULTS

The 9 traps (table) caught 106 fish in 63 days--an average of 1.68 fish per day or 0.19 fish per trap-day. Trap 7, the slat trap, made the best catch--51 fish for 0.80 fish per trap-day. Trap 6, a rectangular trap, was second with 19 and a daily rate of 0.33 fish. Only one other trap caught enough fish to mention--trap 2, a cylindrical trap with a single throat, caught 15 fish during the 63 days or 0.23 fish per trap-day.

Catches by Traps from an Intensively Managed 9-Acre Catfish Rearing Pond

Trap No.	Total Fish Caught	Average Fish Caught Per Day	Percent of Total Fish Caught	Number of Days Trap Caught Fish
	No.	No.	%	No.
1	0	0.0	0.0	0
2	15	0.23	14.2	3
3	10	0.15	9.4	1
4	0	0.0	0.0	0
5	0	0.0	0.0	0
6	19	0.33	17.9	3
7	51	0.80	48.1	7
8 and 9[1/]	11	0.17	10.4	5
Total or Average	106	1.68	100.0	

1/Two hoop nets were fished and their catches have been combined.

DISCUSSION

Several investigators have reported catches taken by traps in rivers and lakes. Baker (1962) reported an average catch of 10.72 white catfish per 48-hour set of basket or slat traps in High Rock Reservoir, Ohio. Starrett and Barnickol (1955) found that commercial fishermen on the Mississippi River were catching 0.22 channel catfish per trap-day in basket or slat traps, and 0.13 channel catfish per net-day in 1-inch mesh hoop nets. Catch rates of channel catfish from Louisiana lakes were 2.15 fish per day with basket or slat traps (Posey and Schafer, 1963, unpublished[1/]) and 2.63 per day with $1\frac{1}{2}$-inch mesh hoop nets (Davis and Posey, 1959). Only one study reported on trapping catfish in intensively managed ponds--an evaluation of slat traps as partial harvesting device--found that 4.61 channel catfish could be caught per trap-day (Posey, 1964, unpublished[2/]).

Because of the high densities of catfish in commercial rearing ponds, we assumed the fish could be trapped easily; however, this proved wrong. The traps failed to catch the minimum arbitrary number of 100 fish per week established as a desirable sample. The wood slat trap caught the greatest number of fish--0.80 fish per day--but this figure is far below the minimum set.

The results indicate that the sampling traps were ineffective for obtaining an adequate sample of commercially reared catfish to determine their growth and general well being. A study of catfish behavior as related to entrapment gear design and fishing methods is needed.

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